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Mariners Weather Log

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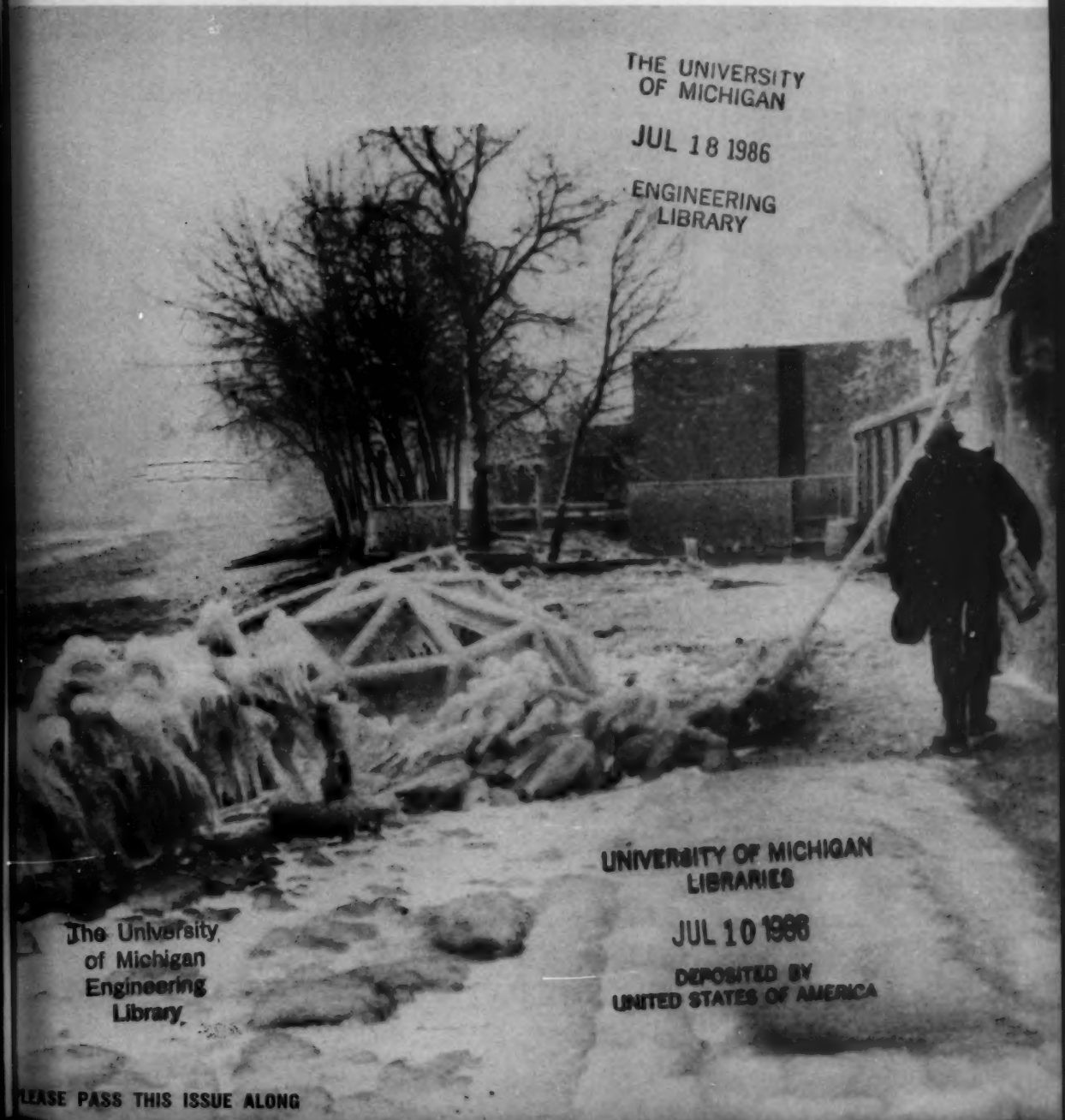

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Mariners Weather Log

Editor: Elwyn E. Wilson

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PLEASE PASS THIS ISSUE ALONG

Front Cover: This house on the shore of Lake Superior received a heavy coating of ice during the storm that passed over the Lakes from December 1 to 3, 1985. Waves tossed debris ashore and flooded low areas. Wide World Photo

The Secretary of Commerce has determined that the publication of this periodical is necessary in the transaction of the public business required by law of this Department. Use of funds for printing this periodical has been approved by the Director of the Office of Management and Budget through September 30, 1986

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Mariners Weather Log

EL NINO/SOUTHERN OSCILLATION DIAGNOSTIC ADVISORY

THE CLIMATE ANALYSIS CENTER/NMC
National Weather Service, NOAA
Washington, D.C. 20233

CURRENT SITUATION

Routine monitoring of climatic conditions in the tropical Pacific shows that for the first time since the major 1982/83 El Nino/Southern Oscillation (ENSO) episode, the pattern of sea surface temperature (SST) anomalies in the eastern tropical Pacific is evolving in a manner resembling the incipient stage of an El Nino event. Specifically, ship and satellite observations over the waters west of Peru indicate that SSTs in that region have gradually changed from below normal values in late 1985 to above normal in January and February, 1986. In February, this region of above normal temperatures expanded northward, then westward along the equator to around 120°W. While the SST anomalies are still relatively small, their rate of increase during the past few months, in both magnitude and areal coverage (See figures 1 and 2), is worthy of note. As can be seen from figure 3, a sharp upward trend in anomalies between October and the following February along the shipping lane which parallels the Peru coast is characteristic of El Nino years. Satellite observations indicate that during February, rainfall was also above normal south of the equator, over the region of above normal SST.

While these conditions were observed west of Peru, data from two northern Peruvian coastal stations showed sharp upward trends in SST anomalies to positive values in January and February. At Talara (4.6°S) SST changed from near normal in January to 2.4°C above normal in February. At coastal stations farther south, SST remained near or below normal. Although periods of heavy rainfall have been observed over the southern interior during the past 2 months, the typical El Nino pattern of recurrent heavy rains in the desert regions of northwest Peru had not developed by the end of February.

These changes in eastern Pacific SST reflect a slow but consistent evolution of the SST pattern across the entire equatorial Pacific during the past 2 years. Viewed on an even larger scale, the associated global Southern Oscillation surface seesaw in pressure between the Australian-Indonesian region and the southeast Pacific also swayed during February in a direction consistent with the development of an ENSO episode, i.e., an increase in the pressure gradient driving westerly wind anomalies. At Darwin, Australia, which is representative of the western end of the pressure seesaw, surface pressure averaged above normal during February. At the opposite end, the key southeast Pacific index station at Tahiti, French Polynesia, showed a sharp fall in pressure. The above normal pressure at Darwin was accompanied by below normal rainfall over large portions of Australia and, based on satellite observations, over western Indonesia and Malaysia.

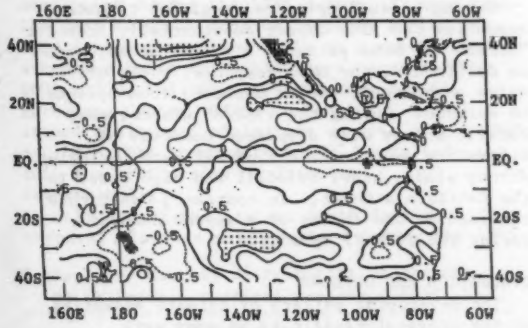

Figure 1. -- Sea surface temperature anomalies for the month of November, 1985. Contours are labelled in degrees celsius. Areas where the temperatures are more than 1 degree above normal are coarsely hatched. Areas in which temperatures are more than 1 degree below normal are finely hatched. Note the area of below normal sea surface temperatures in the eastern equatorial Pacific.

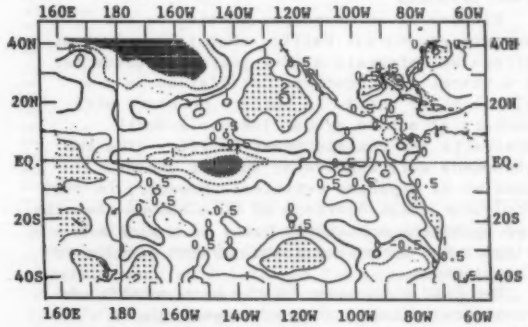

Figure 2. -- Same as Figure 1, but for February, 1986. Note that sea surface temperatures near and south of the Equator in the eastern Pacific are now above normal.

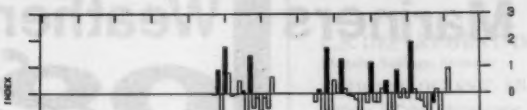

Figure 3. — Differences between the anomalies of sea surface temperature for January/February and the previous November/December periods along the shipping route which parallels the Peru coast between 4°-12°S. The plotted values are standardized anomalies, i.e., the actual values have been divided by there standard deviation. Solid bars are El Nino years. All years in which the index values equaled or exceeded the 1986 value were El Nino years.

In the western equatorial Pacific, between 150°-170°E, anomalously high SSTs have developed during the past few months. Ocean surface temperatures in this region are normally quite high, but current SSTs, which have reached levels near 86°F (30°C, more than 1°C above normal), are rarely exceeded. There are indications that this area of positive SST anomalies has migrated slowly and irregularly eastward during the past few months. As this took place, anomalous westerly surface winds developed to the west of the area of warmest water. These features are also consistent with the early stages of an ENSO episode.

While these developments are positive indicators of an event, other important oceanic features often associated with the initial stages of an ENSO episode are not yet in evidence. In particular, the subsurface thermal structure and sea-level slope across the equatorial Pacific do not appear to be far from normal at this time.

ENSO EPISODES

El Nino is an anomalous warming to the eastern equatorial Pacific that takes place at irregular intervals of 2-7 years and lasts for 1-2 years. The Southern Oscillation is a global-scale seesaw in surface pressure with centers of action around Indonesia-North Australia and the southeast Pacific. The two phenomena were discovered and for decades studied as separate entities. However, in 1969 Professor Jacob Bjerknes of UCLA showed that the two phenomena are simply parts of a single elegant and pervasive global system of climate fluctuations.

The ENSO phenomenon is the most notable and pronounced example of year-to-year global climate variability. A major ENSO episode, such as that which occurred during 1982/83, leads to massive dislocations of the rainfall regimes of the tropics, bringing drought to vast areas and torrential rains to otherwise arid regions. The related atmospheric circulation anomalies extend deep into the extratropics, where they are associated with unusual wintertime conditions over regions as far apart as the United States and New Zealand. Because ENSO is global in nature, a strong occurrence leads to the nearly simultaneous appearance of severe climatic conditions over a variety of regions around the world, as well as major disruptions of the marine ecosystems along the west coast of South and sometimes North America.

Individual ENSO episodes generally follow a similar evolution over a period of 18-24 months. The anomalous ocean warming in the Pacific normally begins near the Ecuador-Peru coast early in the year, then spreads westward into the central equatorial Pacific. The coastal warming usually peaks during April-June, but the warming in the central equatorial Pacific normally continues for several more months, as the high SSTs of the western Pacific spread eastward. The global atmospheric climate anomalies are most widespread and intense near the end of the first year and during the early months of the second year of the episode. i.e., during the Northern Hemisphere cold season.

This period, approximately one year following the intial appearance of warm water in the eastern Pacific, is often referred to as the "mature phase" of the episode. Following the mature phase, the anomaly patterns enter a period of decay that usually spans several months.

Although most ENSO episodes follow a generally similar evolution, each occurrence has a personality of its own, with individual episodes differing in both strength and behavior. For example, the 1982/83 episode was slow in developing, and had a rather unusual evolution. In the end, however, it developed into the most intense episode of the century. The 1972 ENSO was rather typical, except for its unusually devastating effect on the Peruvian Anchovetta fishery. In contrast, what appeared to be an incipient El Nino development in the eastern Pacific in early 1975 aborted abruptly between February and April, but was subsequently followed by a moderate ENSO episode in 1976.

During unusual episodes, regional climate anomalies can also depart substantially from the "normal" El Nino pattern. In some areas, such as California, the ENSO response, while often quite pronounced, varies markedly from episode to episode. During the 1982/83 winter, east Pacific storms were displaced hundreds of kilometers south of their normal path, bringing strong winds, heavy rainfall and high tides to the California Coast. In contrast, California remained in the throes of a severe drought during the 1976-77 episode.

EVALUATION AND OUTLOOK

The developing pattern of climate anomalies in the tropical Pacific is in many ways consistent with the early stages of an ENSO episode. Therefore, it seems prudent to call attention to the possibility of such a development during 1986.

There are a variety of techniques under development for prediction of ENSO. Some of these give positive indications of a 1986 episode. For example, a series of experimental forecasts for research purposes produced by Drs.

Mark Cane and Stephen Zebiak of Lamont-Doherty Geological Observatory, Columbia University using a coupled ocean-atmosphere model of the tropical Pacific gives an unambiguous forecast of a moderate El Nino event during 1986. A Climate Analysis Center statistical model based on the SST change from October through February west of Peru, indicates a high probability of an ENSO episode this year. Other experimental prediction techniques developed by experts in this area give more ambiguous results at this time. Therefore, no strong consensus, yet exists in the U.S. scientific community on the likelihood of a 1986 ENSO episode.

The situation shoud be clarified during the next 2-4 months. During this period NOAA will provide data and information needed to evaluate developments. The Climate Analysis Center will continue to closely monitor conditions in the equatorial Pacific and provide early dissemination of information on the evolving anomaly patterns through its monthly Climate Diagnostics Bulletin.

EASTERN NORTH PACIFIC TROPICAL CYCLONES, 1985

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The 1985 eastern North Pacific tropical cyclone season began on 5 June and ended on 21 November. Spanning 170 days, the season was 3 days shorter than the 1984 season but still 10 days longer than the average of the past 11 years. There were 25 tropical cyclones during the 1985 season, 22 of which were named, setting a new record for the number of named storms during a sason. The monthly distribution of 1985 tropical cyclone activity is shown in table 1 and tables 2, 3, and 4 compare this activity with that of recent years. The 1966-85 period was chosen for comparison due to the excellent satellite coverage over tropical waters since 1966. Prior to that time, some tropical cyclone activity may have gone undetected due to the sparsity of data in that area. A summary of the important features of the 1985 season in given in table 5. Cyclone tracks are in figures 4 through 7.

Eastern Pacific Hurricane Center (EPHC) forecasters issued a record 620 tropical cyclone advisories during the 1985 season, 35 more than the year before. Tropical cyclone advisories were issued four times daily on a regularly scheduled basis for cyclone positions at 0000, 0600, 1200, and 1800. The Central Pacific Hurricane Center (CPHC) in Honolulu, Hawaii issued additional advisories on five of the 1985 cyclones that moved across 140°W longitude and into the CPHC's area of forecast responsibility.

Only one of the eastern North Pacific tropical cyclones moved onshore during the 1985 season, compared to six the year before. Hurricane Waldo, the twenty-third cyclone of the season, moved onshore with 90 kn winds 30 mi southwest of Culiacan, Mexico at 1000 on 9 October. Although newspaper reports indicated that 600 homes and a considerable amount of farmland had been destroyed or damaged, there were no reports of casualties or deaths attributed to the hurricane.

The National Weather Service Satellite Service Field Station, collocated with the EPHC, provided excellent satellite coverage during the 1985 season. The earlier loss of the GOES East geostationary satellite and the subsequent move of the GOES West satellite from 135°W longitude to 98°W longitude still had little effect on EPHC operations. Visual and infrared satellite imagery was available from the GOES and polar-orbiting NOAA satellites. The Satellite Image Display System (SIDS), which had provided continous surveillance of tropical cyclone activity in previous years, was not available during the 1985 season. Continuous surveillance

Table 1. -- Monthly distribution of eastern North Pacific tropical cyclone, 1985*

	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Tropical Depressions	0	0	1	0	0	1	1	0	3
Tropical Storms	0	3	6	1	1	0	0	0	11
Hurricanes	0	2	1	3	3	2	0	0	11
Total	0	5	8	4	4	3	1	0	25

* Cyclones are ascribed to the month in which they began.

Table 2. -- Frequency of eastern North Pacific tropical storms and hurricanes by months and years.

Year	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1966	0	1	0	4	6	2	0	0	13
1967	0	3	4	4	3	3	0	0	17
1968	0	1	4	8	3	3	0	0	19
1969	0	0	3	2	4	1	0	0	10
1970	1	3	6	4	1	2	1	0	18
1971	1	1	7	4	2	2	1	0	18
1972	1	0	1	6	2	1	1	0	12
1973	0	3	4	1	3	1	0	0	12
1974	1	3	3	6	2	2	0	0	17
1975	0	2	4	5	3	1	1	0	16
1976	0	2	4	4	3	1	0	0	14
1977	1	1	1	1	3	1	0	0	8
1978	1	3	4	6	2	2	0	0	18
1979	0	2	2	2	1	2	1	0	10
1980	0	3	3	2	2	2	0	0	14
1981	1	1	3	4	2	4	0	0	15
1982	1	1	6	3	4	2	0	0	19
1983	1	1	6	3	5	3	1	1	21
1984	2	3	3	4	4	2	0	0	18
1985	0	5	7	4	4	2	0	0	22
Total	11	39	77	79	59	39	6	1	311
Average	0.6	2.0	3.9	4.0	3.0	2.0	0.3	0.1	15.6

* Cyclones are ascribed to the month in which they began.

Table 3. — Frequency of eastern North Pacific tropical storms reaching hurricane intensity by months and years.

Year	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
1966	0	1	0	4	2	0	0	0	7
1967	0	1	0	2	1	2	0	0	6
1968	0	0	0	3	2	1	0	0	6
1969	0	0	1	1	1	1	0	0	4
1970	1	0	1	1	0	1	0	0	4
1971	1	1	3	2	2	1	0	0	12
1972	1	0	0	6	1	0	0	0	8
1973	0	1	3	0	2	1	0	0	7
1974	0	2	2	4	2	1	0	0	11
1975	0	1	2	3	1	1	0	0	8
1976	0	2	1	2	3	0	0	0	8
1977	0	0	1	1	1	1	0	0	4
1978	1	2	3	4	1	1	0	0	12
1979	0	1	1	2	1	1	0	0	6
1980	0	2	2	2	1	0	0	0	7
1981	0	1	1	3	1	2	0	0	8
1982	0	0	4	3	3	1	0	0	11
1983	1	1	2	2	3	2	0	1	12
1984	1	3	2	2	4	0	0	0	12
1985	0	2	1	3	3	2	0	0	11
Total	6	21	32	50	35	19	0	1	164
Average	0.3	1.1	1.6	2.5	1.8	1.0	0.0	0.1	8.2

* Cyclones are ascribed to the month in which they began.

Table 4. -- Seasonal Statistics

	Cyclones	Moved onshore	Passed to CPHC NML*	Length of season (days)	Storm hours	Hurricane hours	Hurricanes 55 m/s (100 kt) or greater	Advisories issued
1966	24	4	3	150	-	-	2	447
1973	20	2	0	138	-	-	4	438
1976	18	3	4	151	846	498	3	393
1977	17	0	0	138	343	138	0	193
1978	21	3	3	144	873	540	6	396
1979	13	3	0	120	482	306	4	198
1980	15	0	1	143	474	186	3	420
1981	19	4	2	153	858	432	1	306
1982	26	1	6	180	1044	774	4	509
1983	24	3	3	204	1258	1068	8	582
1984	24	6	3	173	1137	1068	6	585
1985	25	1	5	180	1278	864	7	528
Total	294	34	32	1927	8393	6324	50	4251
Average	20.3	2.8	2.7	160.6	776.3	547.8	4.2	354.3

* Central Pacific Hurricane Center - Honolulu.

instead was provided by the Electronic Animation System (EAS) and the Digital Weather Processing System (DWIPS). Detail on satellite imagery was excellent with full disk resolution at 7 km, sector resolution at 4 km and, on request, high sector resolution at 0.9 km. The gridding of satellite imagery was accurate to within a few kilometers due to the stability of the satellites and easily identifiable landmarks. Enhanced H-curve infrared imagery was especially useful in depicting the high-level cold core centers. Cyclonic intensity was calculated using the Dvorak technique of satellite analysis (Dvorak, 1973).

U.S. Air Force reconnaissance aircraft flew into two of the eastern North Pacific tropical cyclones during the 1985 season. Three flights were made, all during the month of September, while the cyclones were 300 to 400 mi west-southwest of the tip of Baja California. The first flight, with one penetration, was made into hurricane Sandra on 12 September by aircraft returning from standby reconnaissance in Hawaii. The second and third flights were made into hurricane Terry on 21 and 22 September with two penetrations of the cyclone each day.

While satellite imagery continues to improve and is probably one of the most important tools used by tropical forecasters, aircraft reconnaissance and surface ship reports retain their importance as invaluable comparative observations for both the tropical forecasters and satellite meteorologist.

Numerically generated forecast tracks for tropical cyclones in the eastern North Pacific were available from the National Hurricane Center in Miami during the 1985 season. While the numerical forecasts are independent of each other, the forecasts made by the EPHC forecasters are not independent of the numerical forecasts. The average forecast error for all the models for all periods was 120.1 mi. and the average for all periods for the EPHC forecasters was 118.6 mi.

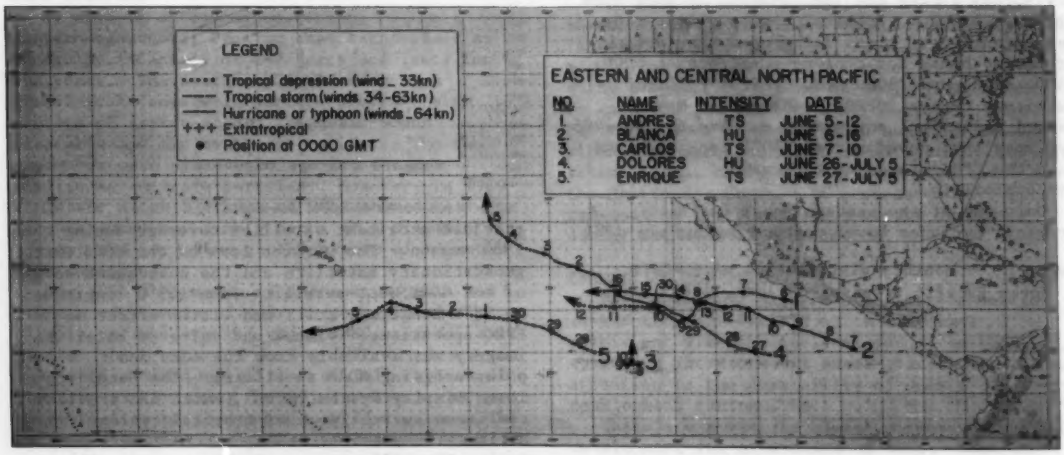

Figure 4. -- Tracks of eastern North Pacific tropical cyclone, 1-6.

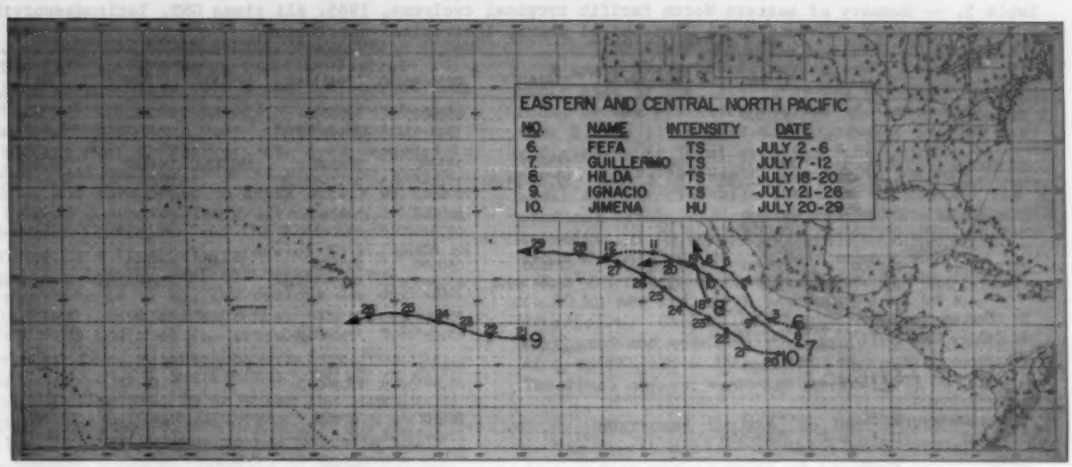

Figure 5. -- Tracks of eastern North Pacific tropical cyclone, 6-10

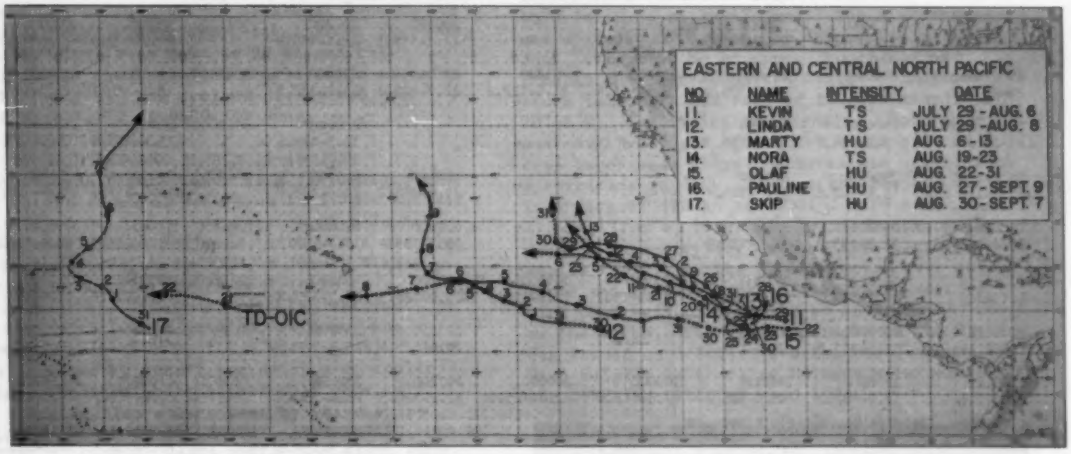

Figure 6. -- Tracks of eastern North Pacific tropical cyclone, 11-17

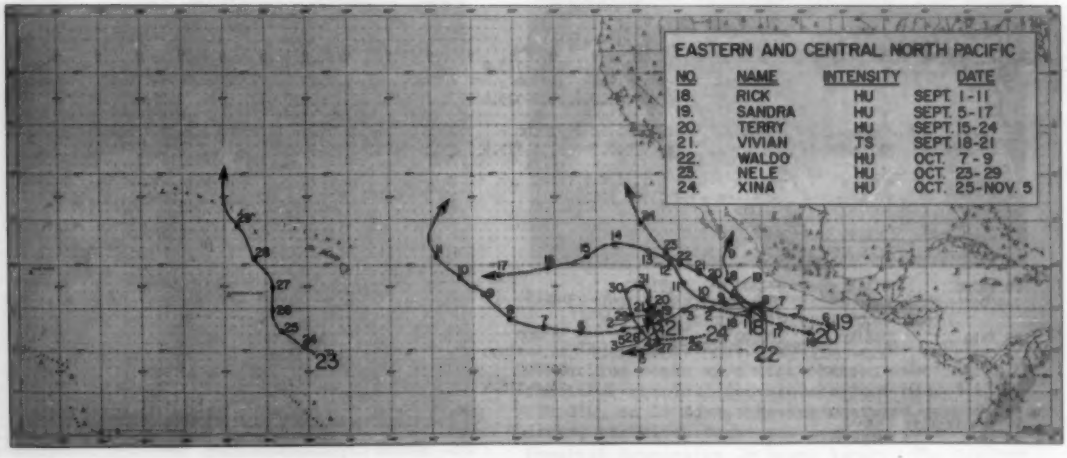

Figure 7. -- Tracks of eastern North Pacific tropical cyclone 18-24

Table 5. -- Summary of eastern North Pacific tropical cyclones, 1985. All times GMT, latitudesnnorth, longitudes west. HU=hurricane, TS=tropical storm, TD=tropical depression.

Cyclone	Depression	Storm	Hurricane	Storm	Depression	Final Position	m/s(kt)	Maximum Wind From	To
TS Andres	051500	051800			080600	120600	31(060)	071200	071800
5-12 Jun	15.5-100.1	15.7-100.6			15.2-112.4	15.8-127.7		17.0-109.8	16.6-110.9
HU Blanca	061800	070600	080000	151800	161200	161800	54(105)	140000	140600
6-16 Jun	10.2-092.8	10.6-094.1	11.6-096.6	17.1-121.4	17.2-123.3	17.2-123.8		16.5-114.6	16.6-115.5
TS Carlos	071800	100000			100600	101800	18(035)	100000	100600
7-10 Jun	08.7-119.0	08.8-120.5			09.3-120.5	11.0-120.0		08.8-120.5	09.3-120.5
HU Dolores	260600	271800	281800	021200	030600	051800	52(100)	010600	011800
26 Jun-5 Jul	09.6-102.5	10.5-107.5	13.0-111.7	20.8-129.2	21.8-132.8	26.9-137.6		17.5-122.8	18.9-125.3
TS Enrique	270600	290000			300000	011200*	18(035)	290000	300000
27 Jun-1 Jul	09.8-123.8	12.4-129.9			13.8-134.0	14.4-139.5		12.4-129.9	13.8-134.0
TS Fefa	021200	030000			050600	061800	31(060)	040000	041800
2-6 Jul	14.8-102.2	15.5-104.4			21.4-110.9	23.3-113.1		19.3-107.8	20.9-109.7
TS Guillermo	071800	081800			101800	120000	26(050)	091800	100000
7-12 Jul	12.1-099.8	14.6-105.1			22.6-117.2	22.8-123.8		19.6-110.5	20.6-111.9
TD Eight	111800					120600	13(025)	111800	120600
11-12 Jul	18.1-117.8					19.4-120.5		18.1-117.8	19.4-120.5
TS Hilda	180000	190000			200600	201200	18(035)	190000	200600
18-20 Jul	17.7-112.0	21.5-113.5			22.2-117.3	22.1-118.4		21.5-113.5	22.2-117.3
HU Jimena	200000	211800	231200	261800	271800	290000	59(115)	241200	250000
20-29 Jul	11.5-103.7	13.9-109.0	16.4-113.4	21.6-122.2	22.7-126.1	23.1-132.9		18.0-116.1	19.0-117.3
TS Ignacio	210000	210600				220600*	31(060)	220000	220600
21-22 Jul	13.2-134.4	13.2-135.5				13.5-139.6		13.4-138.6	13.5-139.6
TS Kevin	290000	291800			060600	061800	28(055)	030000	051800
29 Jul-6 Aug	13.8-102.6	14.4-105.1			21.6-131.2	21.5-133.7		19.9-117.6	21.4-128.8
TS Linda	291800	310600			020000	040600*	23(045)	311200	010600
29 Jul-4 Aug	12.3-123.3	13.6-130.9			15.1-134.4	17.4-139.7		13.7-131.8	14.4-133.8
HU Marty	061800	071200	090000	091800	130000	131800	34(065)	090000	091800
6-13 Aug	14.1-106.2	15.9-109.4	17.4-113.7	17.8-115.5	23.9-126.5	28.7-127.6		17.4-113.7	17.8-115.5
TS Nora	191800	211200			221200	231200	21(040)	220000	220600
19-23 Aug	15.5-111.8	18.0-120.1			20.6-124.4	23.5-127.8		19.0-122.0	19.8-123.2
HU Olaf	220000	240000	260000	280600	291200	310600	39(075)	261800	271200
22-31 Aug	12.9-102.2	12.7-106.9	17.8-112.1	22.4-125.0	22.2-129.5	26.0-130.5		20.0-115.7	21.8-119.9
HU Pauline	271800	310000	041200			051200*	39(075)	050600	051200
27 Aug-5 Sep	15.8-104.1	13.9-115.6	17.7-134.2			18.3-139.8		18.2-138.1	18.3-139.8
HU Rick	010000	021200	061800			090600*	64(125)	090600	090600
1-9 Sep	14.1-106.5	15.3-113.0	12.6-130.4			17.2-139.4		17.2-139.4	17.2-139.4
HU Sandra	051800	070000	080600	140000					
5-17 Sep	12.7-095.5	14.1-101.1	15.5-106.4	22.3-123.0					
			140600	141800	151800	170000	57(110)	090000	091200
			22.2-123.8	21.6-125.4	19.9-129.8	18.8-136.8		15.5-109.5	15.6-110.9
HU Terry	151800	161800	180600	230600	240600	241800	52(100)	200000	200600
15-24 Sep	12.2-098.5	12.7-102.1	15.4-107.1	22.1-117.4	25.8-120.4	29.0-121.6		18.2-110.7	18.4-111.2
TS Vivian	180600	200000			211800	211800	18(035)	200000	211800
18-21 Sep	13.3-116.7	15.2-118.2			14.2-118.9	14.2-118.9		15.2-118.2	14.2-118.9
TD Twenty-two	010000					021800	13(025)	010000	021800
1-2 Oct	12.3-125.3					12.5-132.8		12.3-125.3	12.5-132.8
HU Waldo	070000	071200	081200			090600	46(090)	090600	090600
7-9 Oct	15.0-106.1	16.8-108.1	20.5-109.7			23.1-108.3		23.1-108.3	23.1-108.3
HU Xina	250600	270600	281800	311800	010600				
25 Oct-5 Nov	12.0-111.5	11.3-118.5	13.7-120.5	16.4-119.0	15.0-118.6				
				020600	021200	050600	52(100)	291800	300000
				13.2-118.4	12.9-118.3	10.0-120.2		16.5-121.3	17.0-121.4
TD Twenty-five	210600					211800	13(025)	210600	211800
21 Nov	19.9-114.2					19.5-114.5		19.9-114.2	19.5-114.5

* Passed to the Central Pacific Hurricane Center (CPHC) in Honolulu.

TROPICAL STORM ANDRES, 5-12 JUNE

The 1985 eastern North Pacific tropical cyclone season began with a small disturbed area of thunderstorm activity 250 mi, southeast of Acapulco, Mexico on 3 June. Remaining stationary over 84°F water, the area expanded to a high-level outflow diameter of 300 mi within 24 hrs. and then began to drift slowly westward. By 1500, 5 June , cyclonic circulation could be seen about the center and the disturbance was upgraded to a tropical depression 80 mi south of Acapulco. Turning west-northwestward and accelerating to 11 kn, the cyclone was upgraded to tropical storm Andres 3 hrs. later near 15.7°N, 100.6°W. As the storm moved west-northwest, weather observations from the Russian cargo ship VYSOKOGORSK, 80 mi to the north, were helpful in locating the storm's center. Andres reached 17.2°N, 108.0°W by 0600, 7 June. The storm then turned westward and, reached its maximum intensity of 60 kn 350 mi south of the tip of Baja California at 1200, 7 June. Andres then turned southwest beneath the south side of a weak upper-level HIGH. By 0600, 8 June, winds were down to 30 kn and the cyclone was downgraded to a depression near 15.2°N, 112°W. The cyclone dissipated near 15.8°N, 127.7°W at 0600, 12 June.

HURRICANE BLANCA, 6-16 JUNE

Hurricane Blanca began as a disturbance over the waters south of Nicaragua on 5 June and was classified a tropical depression on 6 June. Rapid development followed, with winds reaching hurricane strength by 0000, 8 June. Blanca moved west-northwestward at 7 to 10 kn throughout its lifetime, reaching maximum intensity of 105 kn at 0000, 14 June when centered near 16.5°N, 114.6°W, (fig. 8). This was followed by steady weakening over cooler water. Weather observations that were helpful in tracking Blanca were sent by these ships ERLANGEN EXPRESS, KEILDRECHT, NANIWA MARU, OLA, ROBERT D. CONRAD, SANTA ADELA, and SANTA CRUZ.

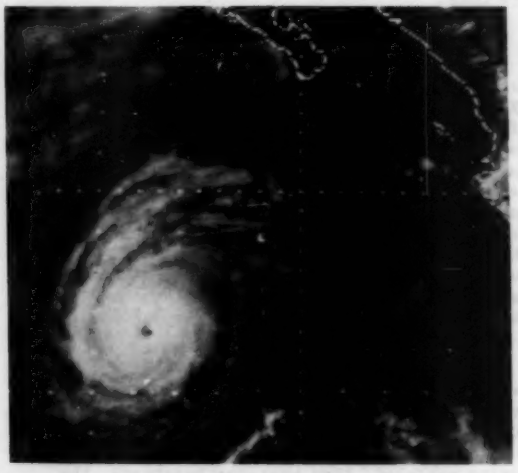

Figure 8. -- Hurricane Blanca with well-defined eye and 54 m/s (105 kn) winds.

TROPICAL STORM CARLOS, 7-10 JUNE

A small disturbance, moving west along the north side of the Inter-tropical Convergence Zone, became the third cyclone of the season near 8.7°N, 119.0°W at 1800, 7 June. Lacking definite upper level steering, the depression slowed and turned south, the north, through a small counter-clockwise loop. As it crossed its previous track, the cyclone reached its maximum intensity of 35 kn and was upgraded to tropical storm Carlos at 0000, 10 June near 8.8°N, 120.5°W. Six hours later, the winds had dropped to 30 kn and the storm was downgraded to a depression. Carlos then began to accelerate northward and eventually merged with the remains of tropical storm Andres, 260 mi to the north. The final advisory was issued at 1800, 10 June.

HURRICANE DOLORES, 26 JUNE-5 JULY

The fourth cyclone of the season developed from a disturbance south of the Gulf of Tehuantepec which had been moving west along 10°N latitude on 24-25 June. The disturbance was upgraded to a tropical depression on 26 June, triggered by an upper trough moving through the central United States. Tropical storm intensify was reached 27 June near 10.5°N, 107.5°W. Continuing to intensify, Dolores moved west-northwestward around the south side of a deep layer mean ridge. Dolores was upgraded to a hurricane at 1800, 28 June and reached maximum intensity of 100 kn at 0600, 1 July near 17.5°N,122.8°W, (fig. 9). Winds continued at maximum intensity for 12 hrs, then began to weaken rapidly as the cyclone moved over colder water and into an area of increasing vertical wind shear associated with an upper-level trough to the north. The final advisory on the cyclone was issued on 5 July. Weather observations that were helpful in tracking Dolores were sent by the DUNEDIN, LILLCOLT, and LYRA.

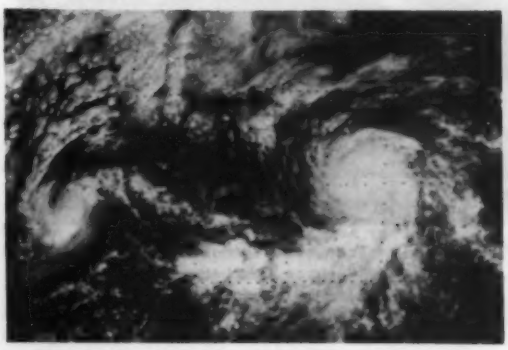

Figure 9. -- Tropical Storm Enrique near 14°N 133°W. Hurricane Dolores to the east.

TROPICAL STORM ENRIQUE, 27 JUNE-1 JULY

Enrique began as a disturbance, embedded in the Inter-tropical Convergence Zone near 9.6°N, 120.0°W, on 26 June. Moving westward over 81°F water, the disturbance was upgraded to a tropical depression 24 hours later. The cyclone then turned west-northwestward around the southwest side of an wave anticyclone off the southern coast of Baja Califronia. Moving over

slightly warmer 82°F water, Enrique's winds increased to a maximum of 35 kn and the depression was upgraded to tropical storm Enrique at 12.4°N, 129.9°W. Winds continued at 35 kn for 24 hrs, then began to weaken as the cyclone move over colder 79°F water. Weather observations from the ships with call letters A8MW and OKEAN were helpful in tracking Enrique during this period. Enrique then turned westward beneath the south side of a large area of high pressure and crossed into CPHC's area of forecast responsibility near 14.5°N at 1600, 1 July.

TROPICAL STORM FEFA, 2-6 JULY

One 1 July , a tropical disturbance moved westward over the warm waters south of the Gulf of Tehuantepec. Similarly to Dolores, the disturbance developed its low-level cyclonic circulation as a vigorous upper-level trough in the westerlies passed to the north. The first advisory on tropical depression 6 was issued at 1200, 2 July when centered 180 mi southwest of Acapulco. It was named tropical storm Fefa 12 hrs later and moved northwestward parallel to the coast and about 200 mi offshore. Fefa reached its maximum intensity of 60 kn at 0000, 4 July, centered 250 mi south-southwest of Mazatlan (fig. 10).

At 1200, 4 July another short wave trough in the westerlies dug southeastward into northern Mexico and sheared away much of Fefa's upper level support. The storm then turned left, passed over the cooler waters south and west of Cabo San Lucas and dissipated on 6 July, west of La Paz. The following ships sent weather observations while in the vicinity of tropical storm Fefa: AFRICA MARU, EXXON NORTH SLOPE, EXXON PHILADELPHIA, GLOBAL PIONEER, LANAI, JINZHOU, PACIFIC HIGHWAY, and TITAN SCAN.

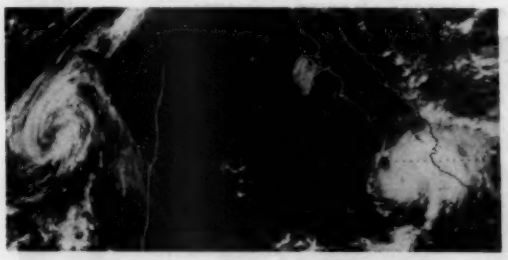

Figure 10. -- Tropical Storm Fefa near the coast of Mexico. Dolores to the west.

TROPICAL STORM GUILLERMO, 7-12 JULY

Guillermo was a fast moving storm that began as a disturbance 300 mi south of the Gulf of Tehuantepec on 6 July. Moving rapidly west-northwestward over 82°F water, the disturbance was upgraded to a tropical depression 280 mi. south of Acapulco at 1800, 7 July. Twenty-four hours later the winds had increased to 35 kn and the cyclone was upgraded to tropical storm Guillermo 275 mi south of Manzanillo, Mexico. The refrigeration ship SATSUMA, 120 mi to the north, was helpful in locating the center of Guillermo during this period. The cyclone then turned northwestward at 18 to 20 kn around the southwest side of an upper level high pressure center moving westward across central Mexico. Passing 50 mi north-northeast of Socorro Island, the storm reached its maximum intensity of 50 kn at 1800, 9 July. Six hours later. the storm turned west-northwestward and began to weaken rapidly over 77°F water. High level outflow over the storm began to shear away to the north on southerly flow associated with the upper-level high pressure area which was now centered over the south end of the Baja California Peninsula. By 10 July, most of the convective activity associated with the cyclone had dissipated and, with only a weak low-level circulation continuing, the cyclone was downgraded to a depression.

The cargo ship ASIAN HIGHWAY, 135 mi to the northeast helped locate the center of the cyclone during this period. Guillermo then began to turn westward, dissipating 30 hrs later near 22.8°N, 123.8°W.

TROPICAL STORM HILDA, 18-20 JULY

Hilda began as tropical depression 18 July. The cyclone moved northward for 24 hrs beneath weak southerly flow associated with an upper-level HIGH centered near the tip of Baja California. By 0000, 19 July, winds near the center had reached their maximum intensity of 35 kn and the depression was upgraded to tropical storm Hilda near 21.5°N, 113.5°W. The research ship PACIFIC FISHER and tanker B.T. SAN DIEGO were helpful in positioning Hilda during this period. The storm then turned westward beneath an upper-level col of light variable winds. With sea-surface temperature near 75°F and low level clouds moving in from the west, the cyclone began to dissipate. The final advisory was issued at 1200, 20 July. Weather observations from the YASHIMA MARU and CENTURY HIGHWAY were helpful in tracking the dissipating cyclone.

TROPICAL STORM IGNACIO, 21-22 JULY

Satellite imagery and weather observations from the Russian research vessel OKEAN and AKADEMIK A. KARPINSKIY located the next cyclone of the season near 13.2°N, 134.4°W at 0000,21 July. Moving over 81°F water, beneath the easterly flow of an upper-level HIGH centered near the Hawaiian Islands, the depression intensified rapidly. Winds increased to tropical storm strength withiq 6 hrs and reached their maximum intensity of 60 kn by 0000, 22 July near 13.4°N, 138.6°W (fig.12). Nine hours later, still at maximum intensity, the cyclone passed into the CPHC's area of responsibility.

HURRICANE JIMENA, 20-29 JULY

An easterly wave moving across Central America and southern Mexico on 18-19 July, generated the next cyclone of the season on the north edge of the Inter-tropical Convergence Zone near 11.5°N, 103.7°W at 0000, 20 July. Moving westward, then west-northwestward, the cyclone was upgraded to tropical storm Jimena at

1800, 21 July, and hurricane Jimena near 16.4°N,113.4°W at 1200, 23 July. Turning northwestward over 81°F water, Jimena reached its maximum intensity of 115 kn near 18.0°N, 116.1°W at 1200, 24 July (fig.11). The cyclone continued at maximum intensity for 12 hrs then began to weaken slowly, dropping below hurricane strength at 1800, 26 July near 21.6°N, 122.2°W, and tropical storm strength 24 hrs later near 22.7°N, 126.1°W. The final advisory on the cyclone was issued at 0000, 29 July near 23.1°N 132.9°W. Several valuable weather observations from the ships STAR DOVER and AFRICA MARU were helpful in tracking Jimena.

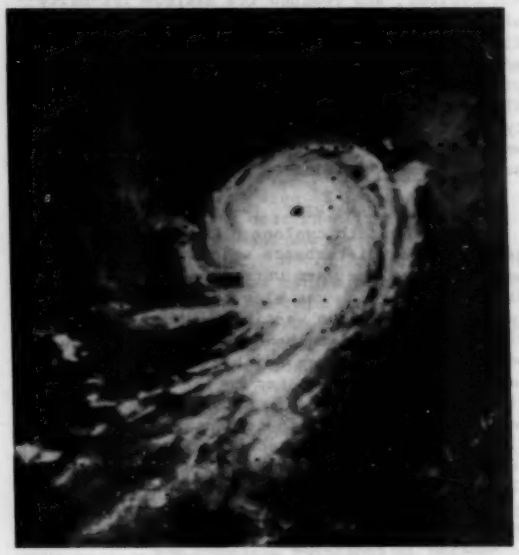

Figure 11. -- Infrared image of Hurricane Jimena with well-defined eye and 59 m/s (115 kn) winds.

Figure 12. -- Tropical Storm Ignacio with 31 m/s (60 kn) winds near 139°W. Jimena developing south of the Baja California Peninsula.

TROPICAL STORM KEVIN, 29 JULY - 6 AUGUST

A tropical wave, moving westward from the Gulf of Tehuantepec on 27 July, developed into the 12th cyclone of the season near 13.8°N, 102.6°W on 29 July. Moving west-northwestward at 6 to 10 kn the depression intensified slowly, reaching tropical storm strength at 1800, 21 July and maximum intensity of 55 kn at 0000, 3 August near 19.9°N, 117.6°W,(fig.13). Turning westward over 77°F water, tropical storm Kevin continued near its maximum intensity for the next 2 1/2 days. On the afternoon of the 5th, the storm began to weaken in an area of increasing vertical wind shear associated with an upper-level trough near 135°W longitude. Kevin was downgraded to a tropical depression on 6 August and the final advisory on the cyclone was issued 12 hours later. Weather observations from the ships PACIFIC CRANE and JGLV were helpful in tracking Kevin during this time.

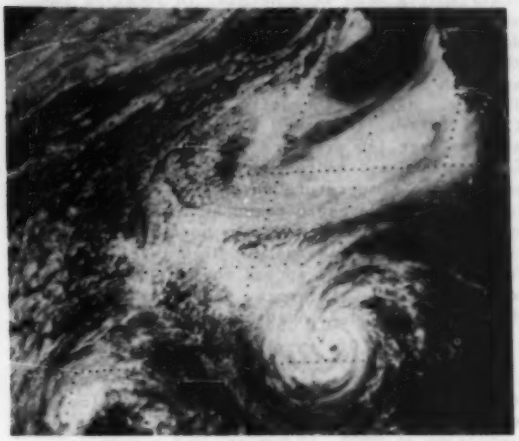

Figure 13. -- Tropical Storm Kevin with well-defined eye and 28 m/s (55 kn) winds near 124°W. Linda is near 140°W.

TROPICAL STORM LINDA, 29 JULY-4 AUGUST

Linda was a relatively weak tropical cyclone, reaching a maximum intensity of 45 kn at 1200 on 31 July, and holding it through 0000, 1 August, then diminishing to a tropical depression 24 hrs later near 15.1°N, 134.4°W. Figure 13 shows Linda near maximum intensity. Linda began as a tropical disturbance near 11°N, 115°W on 28 July. Moving west-northwestward at 14kn over 82°F water, the disturbance intensified slowly and was upgraded to a tropical depression 29 July and a tropical storm on 31 July near 13.6°N, 130.9°W. On 1 August, Linda turned northwestward and began to weaken rapidly. Low clouds, flowing into the low level circulation from the north, further weakened the storm. Linda was downgraded to a depression near 15.1°N, 134.4°W on 2 August and passed into the CPHC's area of warning responsibility 4 August near 17.5°N. Weather observations from the Taiwanese cargo ship TAI CHUNG and another ship with call letters EC9 were used in tracking Linda during this period.

HURRICANE MARTY, 6-13 AUGUST

A tropical disturbance passed into the Pacific from El Salvador only on 3 August, and was upgraded to tropical depression 14 on 6 August, 400 mi southwest of Acapulco. Turning west-northwestward the depression was upgraded to tropical storm Marty at 1200, 7 August near 15.9°N, 109.4°W and hurricane Marty at 0000, 9 August, 425 mi south-southwest of La Paz, Mexico. Hurricane force winds continued for 18 hrs, followed by slow weakening as Marty moved over colder water. The final advisory on the cyclone was issued at 1800, 13 August.

TROPICAL STORM NORA, 19-23 AUGUST

Nora began as a tropical disturbance, breaking away from the Inter-tropical Convergence Zone near 14°N, 107°W on 18 August. Moving west-northwestward over 81°F water, the disturbance intensified slowly. Weather observations from the ship ALEKSANDR SERAFIMOVICH were very helpful in locating the center of the cyclone during this period. The depression remained relatively weak for 24 hrs, then began to intensify, reaching tropical storm strength by 1200, 21 August near 18.0°N, 120.1°W. Maximum intensity of 40 kn was reached 12 hrs later. The storm turned northwest toward a deep-layer low pressure center off the California Coast and began to weaken. As sea-surface temperature dropped to near 73°F and low-level clouds began to enter into the cyclonic circulation from the northwest the cyclone began to dissipate. High level outflow from the cyclone had spread north, then east across northern California, producing a few showers on 22 and 23 August.

HURRICANE OLAF, 22-31 AUGUST

Olaf began as a disturbance over 86°F water south of Acapulco on 21 August. Moving slowly westward, the disturbance was upgraded to a depression at 0000, 22 August, and a tropical storm 48 hrs later near 12.7°N, 106.9°W. Olaf then turned northwestward, intensifying rapidly, was upgraded to a hurricane at 0000, 26 August 400 mi south-southwest of La Paz, Mexico. Olaf then turned west-northwestward and reached its maximum intensity of 75 kn at 1800, 26 August near 20.0°N, 115.7°W. The cyclone continued at maximum intensity for 18 hrs, then slowed and turned west over progressively colder water beneath a deep-layer mean ridge extending from Mexico to Hawaii. Olaf was downgraded to a tropical storm on 28 August and a depression 30 hrs later near 22.2°N, 129.5°W. The cyclone then turned abruptly, to the north toward an upper level trough off the west coast of the United States. The final advisory on the depression was issued at 0600, 31 August. The ALEKSANDR SERAFIMOVICH, HOJIN MARU and SLZ sent valuable weather observations while in the vicinity of hurricane Olaf.

HURRICANE PAULINE, 27 AUGUST - 5 SEPTEMBER

A small intense area of thunderstorm activity, moved west from the Gulf of Tehuantepec on 26 August and became the 17th cyclone of the 1985 season on 27 August. Turning southwest between an upper level, HIGH over Baja California and a LOW off the south coast of Mexico, the cyclone moved to 12.8°N, 107.9°W by 29 August. Weather reports from the Danish cargo ship LEDA MAERSK, the U.S. tanker CHESTNUT HILL, and WINDWARD were helpful in locating the center of the cyclone during this period. The cyclone then turned west for 24 hrs, west-northwest for another 24 hrs, and was finally upgraded to tropical storm Pauline at 0000, 31 August. Winds near the center increased slowly over 82°F water, reaching hurricane intensity at 1200, 4 September at 17.7°N, 134.2°W. The hurricane then turned westward beneath the south side of a deep layer anticyclone, and reached its maximum intensity of 75 kn at 0600, 5 September near 18.2°N, 138.1°W. At 1300, 5 September, Pauline moved across 140°W longitude and into the CPCH's area of forecast responsibility. The tanker CHESTNUT HILL, traveling 200 mi in advance of the cyclone, sent several weather observations that were helpful in tracking the cyclone across the eastern North Pacific.

HURRICANE RICK, 1-9 SEPTEMBER

Rick, the 18th cyclone of the season, began as a tropical disturbance which moved slowly westward over the warm waters south of Salina Cruz. Rick was slow to develop, perhaps retarded by 10-15 kn vertical wind shear in the vicinity. This disturbance moved westward beneath a strong ridge which extended from the southwestern United States to the waters south of the Hawaiian Islands. Satellite imagery indicated an increase in convective activity on 31 August, and by 1 September cyclonic circulation became evident in the low-level clouds. The first advisory was issued on the cyclone at that time, with the depression center about 500 mi south of Mazatlan. Tropical depression 18 continued westward and intensified, reaching tropical storm intensity at 1200, 2 September. Rick slowed and turned southwest on 3 September. This change in direction occurred as the deep-layer mean ridge to the north was depressed southward by a low pressure trough in the westerlies digging southward into California. Rick returned to a more westward track on 4 September, along the 12°N parallel. Further development was rather slow. Since Rick was then in an environment with weak vertical wind shear and warm waters, more rapid intensification would have been expected. The fact that this intensification did not occur could have been due to the storm's close proximity to hurricane Pauline, which was only about 700 mi to the west. Rick finally reached hurricane intensity at 1800, 6 September near 12.6°N, 130.4°W. Rick then turned toward the northwest and intensified more rapidly. By 0000, 9 September, Rick was near 16.7°N, 138.7°W with 120 kn winds near its center, (fig.14). Six hrs later the winds had increased to 125 kn and the forecast responsibility for Rick was passed to the CPHC as the hurricane crossed 140°W longitude. These ships valuable weather observations while in the vicinity of hurricane Rick: DILKARA, ALEKSANDR SERAFIMAOVICH, and MAUI.

Figure 14. -- Hurricane Rick with well-defined eye and 62 m/s (120 kn) winds near 139°W and hurricane Sandra, also with well-defined eye and winds near 57 m/s (110 kn), south of the Baja California Peninsula. Remnants of Pauline are north-northwest of Rick.

HURRICANE SANDRA, 5-17 SEPTEMBER

Sandra began as an area of intense thunderstorm activity near the El Salvador-Guatemalan coast during the late evening of 4 September. Moving rapidly westward the area showed signs of cyclonic circulation on the 5th and was upgraded to a tropical depression. Weather reports from the cargo ship OVERSEAS BOSTON were helpful in locating the center of the cyclone. Turning west-northwestward over 84°F water, the depression was upgraded to tropical storm Sandra at 0000, 7 September. By 0600, 8 September, the winds had increased to 65 kn and the storm was upgraded to hurricane Sandra near 15.5°N, 106.4°W. Sandra then turned westward, reaching its maximum intensity of 110 kn near 15.5°N, 109.5°W at 0000, 9 September (fig.14). Sandra continued to move westward for another 18 hrs, then turned sharply northwestward in response to a deepening upper-level trough off the Baja California coast. A weather report from the Belgium tanker CORAL TEMSE was helpful in locating Sandra during this period. Sandra then turned to the west-northwest as the upper-level trough off the Baja California coast weakened and turned northeastward. At 1746, 12 September, a U.S. Air Force weather reconnaissance aircraft, returning from Hawaii, penetrated Sandra at the 700 mb level. The aircraft reported the center at 21.4°N, 118.0°W, surface winds at 65 kn, and surface pressure at 972 mb. The eye was reported open to the west with low level banding and a circular diameter of 35 mi. Sandra moved west-northwestward for another 12 hrs, then began to turn to the west and weaken. Sandra was downgraded to a storm on 14 September. The storm was now over 77°F water and weakening rapidly.

HURRICANE TERRY, 15-24 SEPTEMBER

On 14 September, a tropical disturbance with heavy thunderstorm activity, moved through Nicaragua, then rapidly westward over 86°F water. By late 15 September, cyclonic circulation was evident and the disturbance became the 20th cyclone of the 1985 season 300 mi south of Acapulco. Turning northwestward, the depression was upgraded to a tropical storm 24 hrs later near 12.7°N, 102.1°W and hurricane at 0600, 18 September near 15.4°N, 107.1°W. The hurricane reached its maximum intensity of 100 kn 300 mi south of Cabo San Lucas. On 22 September, Terry began to turn to the north steered by a cold trough which was digging southwestward into northern Baja California. U.S. Air Force weather reconnaissance aircraft at 1800 on 22 September revealed a poorly-defined eye. Dropsonde data and winds near the surface indicated that Terry had become a minimal hurricane. Terry continued to move to the north, weakening rapidly over colder water and in an area of increasing vertical wind shear. The hurricane was downgraded to a storm on 23 September and a depression 24 hrs later. The center dissipated near 29.0°N, 121.6°W. Weather observations from these ships among others were very helpful in tracking hurricane Terry: ASIAN HIGHWAY, ATIGUN PASS, CALIFORNIAN HIGHWAY, EXXON LEXINGTON, KENAI, KUROBE MARU, PEGGY DOW, SEKI REX, TINEKE, and YASHIMA MARU.

TROPICAL STORM VIVIAN, 18-21 SEPTEMBER

A northward push of the Inter-tropical Convergence Zone on 17 September generated the next cyclone of the season. Moving northwestward, in response to a strong upper-level trough off the northern Baja California coast, the cyclone intensified slowly over 82°F water. By 0000, 20 September, the cyclone had reached its maximum intensity of 35 kn and was upgraded to tropical storm Vivian near 15.2°N, 118.2°W. The storm then turned west, southwest, and southward under the influence of an upper-level HIGH to the northwest and hurricane Terry 480 mi to the east-northeast. Carried south into the Inter-tropical Convergence Zone, Vivian began to weaken and lose its identity. The storm was downgraded to a depression. Weather observations sent by the Russian cargo ship SERGEY YESENIN and AKADEMIK A. KARPINSKIY were helpful in tracking Vivian.

HURRICANE WALDO, 7-9 OCTOBER

Weather reprots sent by the British cargo vessel ALBRIGHT EXPLORER were the first indication that the next cyclone of the season was beginning to develop off the south coast of Mexico on 5 October. By 7 October, cyclonic circulation could be seen on satellite imagery. Turning northwestward, under the influence of a strong upper level trough off the northern Baja California coast, the depression intensified rapidly over 86°F water and was upgraded to tropical storm Waldo near 16.8°N, 108.1°W at 1200, 7 October. Six hrs later the storm turned north-northwestward passing 80 mi east of Socorro Island. Weather reports from ships with call letters DUKY and VRCC were helpful in tracking Waldo during this period. The cyclone then turned north and was upgraded to hurricane Waldo at 1200, 8 October 150 mi south of the tip of Baja California. Waldo continued to move north for another 6 hrs, then turned north-northeastward toward the Mexican coast. Waldo reached maximum intensity of 90 kn at

0600, 9 October near 23.1°N 108.3°W. Figure 15 shows the cyclone just prior to reaching maximum intensity. Weather reports from the tankers KENAI, MORMACSUN, and FORT MACLEOD, and cargo ships FENGTIEN, NEW YORK MARU, OLGA TROPIC CAPE THISTLE and HOLSTENDAMM, and ships with call letters JBQI, and JHIQ, were all helpful in locating the center and intensity of Waldo. The HOLSTENDAMM and CAPE THISTLE 25 mi from the center of Waldo, reported 50 to 60 kn winds and sea-level pressure of 928 mb. Four hrs after reaching maximum intensity, Waldo moved onshore 30 mi southwest of Culiacan. Although there was considerable damage to crops and homes as Waldo moved inland, there were no reports of casualties or deaths.

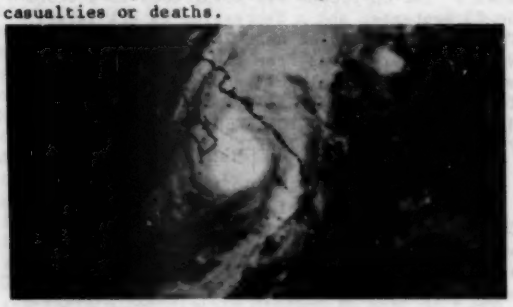

Figure 15. — Waldo with 46 m/s (90 kn) winds near the tip of Baja California.

HURRICANE XINA 25 OCTOBER- 5 NOVEMBER

Tropical depression 24 formed in the southeast quadrant of a deep layer mean anticyclone which remained quasi-stationary near 15°N, 120°W throughout the lifetime of this cyclone. Beginning as a depression on 25 October, the cyclone moved westward and was upgraded to a storm at 0600, 27 October near 11.3°N, 118.5°W. Turning northwestward Xina reached hurricane intensity at 1800, 28 October and maximum intensity of 100 kn 24 hrs later near 16.5°N, 121.3°W. Xina continued at maximum intensity for only 6 hrs, then began to slowly weaken as the hurricane moved toward colder 79°F water to the north of the mean high. At 0000, 31 October, Xina turned toward the south-southwest and the weakening trend accelerated. The hurricane was downgraded to a storm at 1800 and a depression 12 hrs later. As the depression moved south-southwest, the circulation pattern became very disorganized and the center extremely difficult to locate. On 4 November, the winds were estimated at 25 kn. The ships KLIM VOROSHILOV, OTOMAR OSHKALN, and SATURN DIAMOND sent useful weather observations while in the vicinity of hurricane Xina.

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Dvorak, Verson F., 1973: A technique for the analysis and forecasting of tropical cyclone intensities from satelite picture. NOAA Tech. Memo. NESS 45, 19pp.

Mariners Weather Log

CENTRAL NORTH PACIFIC TROPICAL CYCLONES, 1985

Center Pacific Hurricane Center
National Weather Service, NOAA
Honolulu, Hawaii

The Central North Pacific produced two tropical depressions and one hurricane during 1985. Tropical depression 02C became typhoon Skip in the Western North Pacific area of responsibility. Hurricane Nele found in October and tracked northward between 160° and 170°W from 10° to 32°N. Five tropical systems moved across 140°W, longitude into the Central Pacific Hurricane Center (CPHC) area of responsibility from the Eastern Pacific Hurricane Center (EPHC)area. Three of these were hurricanes, one a tropical storm, and one tropical depression during their sojourn through the CPHC area.

Table 6 lists the statistics for the CPHC area and figures 4-7 shows the tracks.

TROPICAL DEPRESSION ENRIQUE, JULY 1-5

Tropical Depression Enrique moved into the CPHC area at 1200 on July 1 after having been a minimal tropical storm near 13°N, 130°W for approximately 24 hrs on June 29. Enrique had formed west of the larger and quite intense hurricane Dolores.

Enrique moved slightly north of west from near 14°N, 140°W on July 1 to 16°N, 150°W on July 4 at an average speed of a little less than 10 kn. Maximum substained winds were estimated to be about 25 kn with weak southwesterlies to the south of the center. On July 4. Enrique changed course slightly and moved on a south of west track. Enrique was a shallow depression at this time and was carried along by the low-level trade wind flow. Enrique passed about 350 mi south of the Big Island of Hawaii at 1200 on July 5. At this time, it became difficult to find westerly winds on the south side to the depression. Lacking a definite closed circulation, the CPHC issued the last advisory on July 5 at a position near 12°N, 158°W.

Moisture carried along by Enrique caused a few localized heavy showers on the windward side of the Big Island of Hawaii on July 5 and over the Kona slopes of the Big Island during the nighttime hours of July 5 and 6. There were no reports of any ships encountering problems within Enrique's circulation.

Table 6.--Central North Pacific tropical cyclones, 1985[1]

NAME	DATES	MAXIMUM CLASS	MAXIMUM SUSTAINED WINDS (KT)	LOWEST PRESSURE (MB)	TOTAL HOURS OBSERVED
ENRIQUE	Jul 1-5	Tropical Depression	E25 (SFSS)	N/A	102 (TD)
IGNACIO	Jul 21-26	Hurricane	E115 (SFSS, RECCE)	960 (RECCE)	72(H), 30(TS), 6(TD)
LINDA	Aug 4-8	Tropical Storm	E40 (SFSS)	N/A	30(TS), 79(TD)
01C	Aug 20-21	Tropical Depression	E25 (SFSS)	N/A	30(TD)
02C (SKIP)[2]	Aug 30 - Sep 8	Tropical Storm	E70 (JTWC, RECCE)	N/A	6(TS), 6TD)
PAULINE	Sep 5-9	Hurricane	E75 (SFSS, RECCE)	973 (RECCE)	66(H), 18(TS), 12(TD)
RICK	Sep 9-11	Hurricane	E125 (SFSS)	N/A[3]	42(H), 12(TS), 6(TD)
NELE	Oct 23-29	Hurricane	E80 (SFSS, RECCE)	976 (RECCE)	108(H), 42(TS), 6(TD)

Key
H Hurricane
TS Tropical Storm
TD Tropical Depressions

[1]Data pertains only to period tropical cyclone was in the central Pacific
[2]TD 02C named by the Joint Typhoon Warning Center and all reconnaissance flown under JTWC tasking
[3]RECCE flown after hurricane reached peak and in weakening trend

HURRICANE IGNACIO JULY 21-26 1985

Hurricane Ignacio developed rapidly from a weak tropical disturbance to near hurricane strength while moving westward along 14°N between 130°W and 135°W on July 21 and 22. This is somewhat farther west than usual for this type of rapid cyclognesis to take place, i.e., over waters with sea-surface temperatures of about 27°C. Ignacio crossed 140°W at about 22/1200. The Central Pacific Hurricane Center (CPHC) issued its first advisory on Tropical storm Ignacio at 1500, with maximum sustained winds estimated on the 22nd at 60 kn. A U.S. Air Force reconnaissance airplane flew into the developing cyclone at daybreak the same morning and estimated the maximum sustained winds to be 75 kn around a well-developed eye. Ignacio was subsequently upgraded to a hurricane.

Ignacio continued its rapid development while moving on a west-northwesterly course at 8 to 12 kn. Later on the 23rd and early on the 24th, maximum sustained winds had reached 115 kn with an estimated central pressure of 960 mb, thus rivaling some of the more intense hurricanes observed in the central Pacific. The hurricane appeared to have peaked in its intensity during this period. An upper-level trough in the westerlies to the northwest of the Hawaiian Islands was slowly moving closer to the approaching Ignacio. The environment was rapidly becoming less favorable for sustaining Ignacio as the upper-level southwesterlies descended and colder and drier air aloft began to affect the storm.

Satellite imagery received during the night at about 1200 on the 24th indicated weakening taking place as the eye had become irregular and disappeared. U.S. Air Force Hurricane Hunters flying into the cyclone at 24/1800 confirmed the weakening trend while locating the center near 16°N, 147°W in an area where other hurricanes (Dot-1959 and Fico-1978) at approximately the same time of the year had maintained their strength. Slight intensification may have occurred later in the day as the eye redeveloped and the hurricane assumed a due westerly course along 16°N.

The strong trough in the upper westerlies to the northwest of Ignacio made recurvature or at least a more northerly track toward the Hawaiian Islands possible. Numerical guidance also showed a tendency for the storm to move on a more northerly track. A Hurricane Watch was issued at 250300Z for the Big Island of Hawaii. The watch was subsequently cancelled at 260300 GMT as Ignacio started to weaken again about 265 mi southeast of Hilo and turned to a west-southwesterly course as the effects of the Big Island's topography and the more shallow steering by the trade wind flow made themselves felt.

Ignacio passed to the south of the Big Island at tropical storm strength about 26/1200 in a rapidly weakening state. There was little effect on the weather over the Hawaiian Islands. However, high surf in the 10 to 15 ft range pounded the southeast facing shoreline of the Puna and Kau coastlines on the Island of Hawaii. The surf peaked on the afternoon of the 25th with some damage to roads and structures near Kalapana and Kapoho reported. The high surf originated from swell generated 2 days earlier when Ignacio was near 145°W and a young and vigorous hurricane. The NOAA/NWS buoys to the southeast and south of the Hawaiian Islands produced a valuable record of the energy spectrum of the swell generated by this hurricane.

Rainfall from the storm was generally light and only affected the islands of Hawaii and Maui. There were a few reports of amounts greater than 2 ins. received on the 26th from stations on the windward slopes of Maui and Hawaii.

IGNACIO was downgraded to a tropical depression on the 27th. There were no reports of damages or casualties to ships.

TROPICAL STORM LINDA AUGUST 4-8, 1985

Linda entered CPHC area of responsibility early on August 8 as a tropical depression. Just 48 hrs earlier, Linda had been a tropical storm in the eastern Pacific.

The tropical depression was moving slowly

toward the northwest when it crossed 140°W near 17.5°N and appeared to be gaining strength again. At 1800 on the 4th, the winds around Linda were estimated to be 40 kn and Linda was upgraded to a tropical storm. LINDA remained a tropical storm for about 24 hrs and on the 5th started to weaken again and was downgraded to a tropical depression near 18°N, 143°W with maximum sustained winds estimated at about 30 kn.

LINDA began to feel the effects of the trade wind flow to its north and began to move on a south of west course. Linda passed south of the Hawaiian Islands on August 8. Its closest point of approach was 150 mi south of South Point, Hawaii. Some heavy showers associated with Linda's circulation fell along the windward slopes of the Big Island of Hawaii and Maui with some totals in the 5 to 10 in., range. Linda continued westward at a moderate speed of 15 kn while weakening further. The CPHC issued its last advisory on LINDA on August 9. There were no reports of damages or casualties to ships.

TROPICAL DEPRESSION 01C AUGUST 20-22, 1985

Tropical Depression 01C developed from a disturbance embedded in the trade wind flow south of the Hawaiian Islands. The disturbance passed about 350 mi south of the Big Island of Hawaii on August 19 and had been tracked by the CPHC for several days.

The disturbance appeared to be going through a strengthening phase near 15°N, 164°W and the CPHC issued its first advisory on T.D. 01C at 2100. T.D. 01C moved on a west-northwesterly course at a rather fast forward speed of 20 kn with maximum sustained winds estimated at 30 kn. The depression passed just south of Johnston Island at 21/1500 with sustained winds of 25 kn reported on the tiny atoll.

A large trough in the upper-level westerlies had been developing to the north and west of the depression. The close proximity of the upper-level trough and its associated southwesterlies working their way into the lower troposphere limited further development of T.D. 01C.

TROPICAL DEPRESSION 02C/TYPHOON SKIP
AUG. 30 - SEPT. 8

Tropical depression 02C developed from a disturbance which passed well south of the Hawaiian Islands late in August. The CPHC tracked the disturbance for several days and determined the system had developed into a tropical depression on August 30 and was in a favorable environment for continued development. The CPHC issued the first advisory on T.D. 02C at 2000 August 30, when the system was centered near 13°N, 179°W.

The Joint Typhoon Warning Center (JTWC) on Guam took over responsibility for the issuance of subsequent bulletins with the 31/0300 advisory. T.D. 02C continued to strengthen west of the International Dateline and at 31/0900 was christened tropical storm Skip by the JTWC.

Skip moved in a northwesterly direction after crossing the dateline and for time became a threat to Wake Island. However, the Tropical Upper Troposheric Trough (TUTT) to the north and west of Skip began to steer the system northward and eventually caused it to recurve toward the northeast. During this period, Skip went trough two strengthening phases and reached typhoon intensities on two occasions, once for about an 18 hr period on September 1 and again for about a 24 hr period on the 7th.

Skip crossed the International Dateline moving toward the northeast on September 8 as a weakening tropical storm, rapidly taking on extratropical characteristics. The CPHC assumed responsibility for advisories at this time and issued the final advisory on Skip at 0300. The system was subsequently carried as a gale LOW in the high seas marine bulletin issued by the Weather Service Forecast Office in Honolulu.

HURRICANE PAULINE SEPTEMBER 5-9

Hurricane Pauline entered the CHPC area of responsibility on September 5, crossing over from the eastern Pacific near 18°N 140°W. Pauline had become a hurricane 24-hr earlier near 18°N 134°W and was in the prime of her life with maximum sustained winds estimated at 75 kn. Pauline remained a steady state hurricane at this intensity for the next 2 days as it moved westward and later northwestward at a forward speed of 10 kn in the general direction of the Hawaiian Islands.

A Hurricane Watch was issued for the Big Island of Hawaii at 2100 on the 6th when Pauline was located about 550 mi east of Hilo as it appeared the storm could affect the weekend weather over the Hawaiian Islands. Pauline subsequently turned on a more northwesterly and later northerly course heading north along the 146° meridan while weakening. As result of PAULINE's change in direction of movement, the Hurricane Watch was canceled at 1500 on the 7th.

Swell emanating from Pauline's circulation did cause high surf conditions along the east facing shores of all the Hawaiian Islands. Surf heights of 10 to 15 ft were reported along the Puna and Kau coastlines of the Big Island of Hawaii and caused the temporary closure of several roads due to debris being tossed up on the thoroughfares by breaking waves. No damage to roads or property was reported.

An upper tropospheric trough moving southeast toward Pauline caused her to veer to the north. Once Pauline turned to a more northerly course, she began to feel the effects of shearing stresses of the upper-level southwesterlies and began to weaken. The upper-level flow predominated and the rapidly weakening low-level circulation was carried northward over the next several days. Pauline was downgraded to a tropical storm near 23°N, 146°W at 08/1500 and tropical depression at 09/0900.

The last advisory (number 53 ... denoting a life cycle of 13 days) was issued by the CPHC at 09/2100. The remnants of Pauline moved northwestward very slowly into an area of low pressure near 30°N, 150°W , south of a large blocking HIGH centered in the Gulf of Alaska. A recognizable circulation in the low levels was discernible in satellite imagery for several days as it drifted westward far to the north of the Hawaii Islands. There were no reports of casualties or damage to ships.

HURRICANE RICK SEPTEMBER 9 - 11

Hurricane Rick was a very powerful tropical cyclone when it crossed 140°W into the CPHC area of responsibility at 1200 September 9. Rick was well developed, circular, and symmetrical with a relatively large 40 mi diameter well-defined eye. Maximum sustained winds were estimated at 125 kn and made Rick one of the most intense hurricanes of record in the central Pacific exceeding by 5 kn the 120 kn maximum intensities of Susan in 1978, Celeste in 1972 and the 115 kn winds of Fico in 1978 in the same area of the Pacific just east of 140°W. Only Hurricane Patsy in the pre-satellite era of 1959 may have exceeded Rick in intensity.

Rick was at his peak intensity as he crossed 140°W moving in a northwesterly direction at 10 kn along a path following Pauline which preceded Rick through the area several days earlier. Satellite imagery suggested a weakening trend commencing on the 10th as the eye became ragged and filled with low cloudiness. Air Force reconnaissance began to fly into Rick and made the first fix on the system at 0000 the 10th. The weather officer on board the aircraft estimated the winds at 100 kn. A dropsonde released in the eye of Rick showed an extrapolated central pressure at the surface of 951 mb.

The same forces which caused the shearing, weakening, and a trend toward recurvature on Pauline several days earlier began to affect Rick. Rick, thusly, declined rapidly in intensity in the same general area 600 mi east of Hilo and at 11/1200 was downgraded to a tropical storm. Twelve hours later, Rick was downgraded to a tropical depression. The remnant low-level circulation was carried northward toward the same area of low pressure which Pauline moved into several days earlier. Satellite cloud imagery continued to show the existence of a weak low-level circulation for several days.

Rick's intensity was much greater than Pauline's and would've created much larger surf along the east facing shores of the Hawaiian Islands, but because he turned toward the north sooner than Pauline, the significantly larger swell emanating from Rick passed well to the east. The surf did rise somewhat, but nowhere near the heights experienced with the passing of Pauline.

There were no reports of casualties or damages to ships. However, the U.S. Coast Guard received a report on a sailing vessel which was en route to the Hawaiian Islands via the Panama Canal as being overdue. The course of the vessel was not known, therefore, there was no way of telling whether PAULINE or RICK had a direct bearing on the vessel being overdue.

HURICANE NELE OCTOBER 23-30, 1985

The CPHC began to track a disturbance in the intertropical convergence zone near 10°N, 145°W on October 20. The disturbance moved westward along 10°N and passed to the south of Hawaii on the 23rd showing signs of intensification. The CPHC issued its first advisory on tropical depression 03C at 1800 on October 23. Poor satellite imagery made the system difficult to fix and classify using the Dvorak technique as 03C was near the western edge of GOES West pictures. Forecasters at the CPHC felt 03C was intensifying rapidly and 6 hrs later at 24/0000 upgraded 03C to tropical storm and named it Nele.

Nele continued to intensify while moving on a more northwesterly course. NELE reached hurricane strength near 14°N, 164°W at 25/1200 as she turned to a northerly course and followed the 164° meridan at a slow forward speed of 5 kn. Nele's behavior during this period was very similar to two other late hurricanes: Nina in November 1957 and Iwa in November 1982. Both of these hurricanes caused considerable damage to the Hawaiian Islands even though Nina turned westward before actually striking the islands. Nele reached her peak intensity of 80 kn at about 0000 on the 26th. During the next 18 hrs, large swell emanating from Nele began to reach the southern shores of Kauai where in the forenoon on the 26th, surf of 10 ft began to wash over the low beach roads in the Poipu area.

The steering flow over Nele was very weak as she drifted northward, and a trough in the upper-level westerlies to the northwest of Nele caused great concern to the forecasters at the CPHC. The upper-level pattern was becoming very similar to that associated with Iwa's recurvature to the northeast in 1982. A hurricane watch was issued for the Hawaiian Islands early on the 26th. The next 24 hr were one watch-and-see as Nele continued to move slowly northward. Nele showed signs of turning to the northwest on the morning of the 27th but this movement was uncertain as she was in an area of extremely poor satellite surveillance. Air Force reconnaissance aircraft flew into Nele at approximately 27/1500 and confirmed that she had indeed begun to change course toward the northwest. The hurricane watch for the Hawaiian Islands was subsequently canceled at 27/1845.

NELE now assumed a course of about 330° with a forward speed of 10 kn. She had become a steady state hurricane with maximum sustained winds of 70 kn and moved across the leeward islands of the Hawaiian chain passing about 100 mi west of French Frigate Shoals. Closest approach to Tern Islands, where the National Weather Service maintains an automatic weather station, occurred at about 28/1600. The surface pressure recorded at that time was 1000 mb sustained winds were reported from the southeast at 31 kn with gusts to 43 kn. The central pressure of Nele at this time was estimated by Air Force reconnaissance aircraft using a dropsonde as 985/MB and the maximum surface winds estimated at 75 kn.

Several fishing boats spent a rough night hove to at French Frigate Shoals as huge southeasterly swell and waves churned the shallow waters of the reef surrounding the island. The ALASKA OHANA farther west near the Gardner Pinnacles and more directly in the path of Nele was partially disabled and needed Coast Guard assistance. Other fishing vessels near Maro Reef and Laysan Island had an easier time as they were on the weaker, left hand semicircle of the hurricane.

Nele assumed a northerly heading near 26°N, 170°W and followed the 170° meridan with her intensity fluctuating near the minimum hurricane intensity of 65 kn. One vessel located in the dangerous right-hand semicircle reported winds of 70 kn with seas of 30 to 40 ft at 29/1800 some distance to the east of the center. Nele was at this time starting to accelerate northward. Recurvature toward the northeast started near 32°N, 170°W at 30/0600 and finally began to weaken. Nele was at this time classified as an extratropical storm and the final advisory was issued. The remains of NELE moved into the shipping lanes near 40°N, 160°W on October 31.

The CPHC issued 30 advisories on NELE. There were no reports of serious damages or casualties to ships except for the ALASKA OHANA. The tug MOANA HOLO in route from Johnston Island to Honolulu provided the CPHC with several reports near 19°N, 165°W as she rode out the dangerous north semicircle of Nele.

Marine Observations Program

Marine Observations Program
Martin S. Baron
National Weather Service, NOAA
Silver Spring, Maryland

THANKS FOR PROJECT GALE OBSERVATIONS

We thank the many vessels who provided hourly observations from the western Atlantic in support of the "Genesis of Atlantic Lows Experiment" -- GALE. Your data will be used by the GALE research team as they evaluate the storm systems that formed during the project period. Any remaining observations for project GALE should be forwarded through the PMO's.

SHORTAGE OF OBSERVATIONS FROM COASTAL WATERS

For regular operational weather forecasting, we are not receiving enough weather observations from coastal waters (out 200 mi. from shore). I have had several discussions with Canadian VOS Program Coordinator, Mr. George Payment, and we are working on a uniform policy for the United States and Canada in an effort to increase the number of observations. Sometime in the near future, we may request observations at the intermediate standard times (03, 09, 15, 21 GMT) from vessels operating in coastal waters. This would be in addition to observations at the four main synoptic hours. Vessels will be informed by mail of any change in policy. In the meantime, please remember that the NWS needs your coastal zone reports. Whenever you can, please make sure to transmit your observations to the National Weather Service.

HURRICANE LETTER

By the time this issue of the Mariners Weather Log goes to print, the annual "hurricane letter" will have been sent to all VOS program ships. This is to remind you of the danger that these storm systems present, and also to request special observations from vessels located within 300 mi. of the storm center. The hurricane letter is reproduced here for your convenience.

COMMUNICATIONS BOOKLETS

We are also mailing to you the new "Radio Stations Accepting Ship Weather Observations" booklet, dated May 1986, and a supplement to the "Worldwide Marine Weather Broadcast" booklet. A fully-revised edition of "Worldwide Marine Weather Broadcasts" will be available next year.

CERTIFICATE FRAMES

All PMO's have been provided with walnut frames to be presented with certificates of membership in the Voluntary Observing Ship Program. The frames have been purchased from the Eastern Carolina Vocational Center in Greenville, North Carolina, which provides employment to handicapped adults. All vessels newly recruited into the VOS program will receive a framed certificate. Vessels already in the program can ask their PMO's for a frame.

U.S. GOVERNMENT PROPERTY LABELS

You may have noticed your PMO attaching a "Property of U.S. Government, National Weather Service" sticker onto a barometer or barograph. Some vessels forget to report changes in mailing address, agent or owner, to the NWS, which makes it difficult for us to keep track of equipment. We have also had some vessels scrapped overseas, resulting in the loss of equipment. Whenever your vessel has a mailing address change; goes into long-term layup; is sold; or about to be scrapped, please contact your PMO. He will make any changes needed to our computerized mail distribution list or come to the vessel to recover instrumentation. In some cases, equipment is shipped back to the NWS.

TRANSFER

John Orgler, PMO in Chicago, has been selected to be the NWS Cooperative Program Manager for the State of Illinois. The PMO position in Chicago will be filled shortly.

TRAINING

Steve Renard, Marine Forecaster at the Seattle Ocean Service Unit, will spend 2 wks in June onboard the EMPIRE STATE, training vessel of the New York State Maritime Academy. Steve will help train about 300 cadets to take weather observations and understand weather charts and the various forecast products issued by the National Weather Service.

FORMS CHANGES

"Ship's Weather Observations," NOAA Form 72-1A, has had its number designation changed to

WS Form B-81. The only change made to the form is the units used for pressure reporting, now hectopascals instead of millibars. Both have the same numerical value, so no change is needed to our barometer scales. "Weather Report for Immediate Radio Transmission,"NOAA Form 72-4A, is now WS Form B-80. It has been revised so that report transmission methods now appear in detail on the front of the form. Remaining copies of the old forms should be used before switching to the new ones.

RETIREMENT

Don Olson (fig. 16), PMO in Seattle, has announced that he will be retiring this July 3. Don will complete over 40 yrs of Government service, some 35 yrs with the National Weather Service. In the 1950's, he worked with the Pacific Weather Patrol (PWP), serving on board ocean station vessels and moving ships, making over 50 voyages. Don was the PMO in San Francisco from 1959 through 1961. From 1961-1972, Don was the assistant manager for the PWP. In 1972 he became the PMO in Seattle. Because of his outstanding contributions in the field of Marine Data Acquisition, the Department of Commerce honored Don by presenting him the Bronze Medal in 1978. Don and his wife Barbara plan to remain in the Seattle area, at 10505 N.E. 45th Street, Kirkland, Washington 98033.

Figure 16.-- Don at work, looking very much at home, aboard the MV SIENA, 1980.

Dear Master, Mates and Radio Officers:

The hurricane season commences June 1 and runs through November 30. The National Weather Service and the National Hurricane Center will be keeping a close watch on the meteorological situation during this period, especially over the oceans. Increased vigilance is also required on your part.

When a tropical storm is discovered, its position, projected path of movement, and expected future strength will be broadcast as an advisory. Ship's weather observations are extremely useful to the meteorologist when evaluating these storms. You can assist us in making better forecasts as follows:

1. When within 300 mi. of tropical storms or hurricanes, transmit weather observations at least every 3 hrs. Hourly reports when within a storm (winds over 48 kns) would be very beneficial, if ship routine permits.
2. In the "Remarks" section of the "Ship's Weather Observations," Form 72-1A, and the weather message, Form 72-4A, include the lowest pressure and/or the highest wind and the time of occurrence since the last synoptic (00, 06, 12, or 18Z) report, if:
   a. The pressure is 5 mb lower and/or,
   b. The wind is more than 48 kn and has increased 15 kn since the last synoptic report.
3. Use the prefix STORM for the weather message when the wind is 48 kn or more. Also, use the name, if in a named storm or hurricane.
4. Example of weather report message: STORM (standard weather report) HURRICANE WENDY 1420Z MIN PRES 949 HPA 1440Z MAX WIND 90 KN GUST TO 120 KN

In addition, whenever the weather is significantly worse than forecast, you should send a special report using the prefix SPREP.

Weather reports from Voluntary Observing Ships continue to form the basis for meteorological analyses of marine areas, and we thank you for your cooperation. Please refer to the Attachment on communications procedures as needed.

Sincerely,

Martin S. Baron
Voluntary Observing Ship
Program Manager

WEATHER MESSAGE COMMUNICATIONS

SITOR or CW Weather Reports through the U.S. Coast Guard

U.S. Coast Guard radio stations are first priority for receiving weather messages from ships properly equipped. This is because there is no further cost to the Government and the messages are immediately available to AMVER. No address preamble (i.e., OBS METEO WASHDC) is necessary. Start all weather messages with the ship's radio call sign.

INMARSAT Weather Reports

INMARSAT-equipped ships may transmit weather messages, using the following procedures after the message is composed off-line:

1. Select U.S. Coast Earth Station Identification Code 01.
2. Select routine priority.
3. Select duplex telex channel.
4. Initiate the call.
   Upon receipt of GA+ (Go Ahead),

5. Select dial code for meteorological reports, 41, followed by the end of selection signal, +.

   41+ (or 00 230 89406+)

6. Upon receipt of our answerback, NWS OBS MHTS, transmit the ship's call sign and the weather message followed by five periods. Do not send any other preamble. Example:

   GA+
   41+
   NWS OBS MHTS
   WLXX 29003 99131 70808 41998 60909 10250
   2021/ 440110 52003 71611 85264 22234
   00261 20201 31100 40803 .....

   The 5 periods indicate the end of the message.

SITOR or CW Weather Reports through Specified U.S. Commercial Radio Stations

If the U.S. Coast Guard cannot be contacted and the ship is not INMARSAT-equipped, as a back-up, U.S. commercial radio stations specified in the publication, "Radio Stations Accepting Ship's Weather and Oceanographic Observations," may be contacted to relay weather messages. The preamble, "OBS METEO WASHDC," is required. The ship's radio call and the first group of the weather message is never combined; however, the groups following should be combined to make 10-character groups to minimize the cost.

Example:

OBS METEO WASHDC

WLXX 2900399131 7080841998 6090910250
2021/40110 5200371611 8526422234 0026120201
3110040803

Only the current observation should be transmitted via commercial radio.

U.S. High-Sea Forecast and Warning Areas

Weather report messages will be accepted from the following forecast and warning areas without cost to the ship or company. Charges are handled automatically if the prescribed procedures are followed:

Pacific:	160°E eastward to coast and north of 25°S
Atlantic:	35°W westward to the coast, including Gulf of Mexico and the Carribean, and north of 3°N
Guam:	Between 5°N and 25°N and from 135°E to 180°
INMARSAT ONLY:	South of 60°S

Single Sideband, SSB (Radiotelephone) Voice Weather Reports

Ships (yachts) equipped with SSB radios may report to U.S. Coast Guard weather message in the ship synoptic code by phonetically pronouncing the numbers of the code. The advantage of this method is the report does not have to be reformatted to enter the computer systems, but is seen as another ship report.

Timeliness

All weather messages are degraded by time, so they should be transmitted as close to synoptic observation time as possible. This ensures their use in preparing weather charts, forecasts, and warnings.

Weather Reports in Coastal Waters

The weather starts to change as soon as the air passes from a land to water surface. Coastal ship reports often provide early warning of developing storms, so any reports you can make in coastal water will be very useful to the forecasters.

NEW MARINE OBSERVATIONS PROGRAM LEADER

Effective June 22, 1986, Vincent Zegowitz will be the new Marine Observations Program Leader replacing Jerry Nickerson, who retired February 3, 1986. Vince comes to us with a varied background in marine activities. He has been involved with coordinating the collection of oceanographic data from ships of opportunity, application of satellite data to oceanographic analysis, the establishment of quality control procedures and publication of marine data. He is active in international work of the IGOSS/IOC.

As an officer in the U.S. Navy, Vince was involved in naval communications, marine research and operational weather activities aboard ship. He has held positions in NWS, NOS and EDIS. His most recent work dealt with requirements for marine data and the promotion, care and feeding of the Shipboard Environmental Acquisition System (SEAS). Vince holds an advanced degree in Environmental Systems Management from American University with undergraduate degrees from St. Francis, Loretto and Clatsop Colleges.

PORT METEOROLOGICAL OFFICERS ADDRESSES AND TELEPHONE NUMBERS

GREAT LAKES PORTS
Port Meteorological Officer
National Weather Service, NOAA
O'Hare West Higgins Road
Rosemont, IL 60018
312-298-1263 (FTS 353-4680/2455)

MARINE VOS PROGRAM COORDINATOR
Mr. George Payment
Marine Meteorological Officer
Atmospheric Environment Service (AFOO)
4905 Dufferin Street
DOWNSVIEW, Ontario
M3H 5T4
Telephone Number 416-667-4515

Tips to the Radio Officer

Julie L. Houston

National Weather Service, NOAA
Silver Spring, MD

CORRECTIONS TO WORLDWIDE MARINE WEATHER BROADCASTS (January 1985 Edition)

PAGE 8
ADD: KEC63 - Detroit, KIH29 - Flint and label triangle next to Marquette, Houghton to NOAA Weather Radio Network Map.

PAGE 12
CHANGE: Detroit to Ann Arbor in first paragraph

PAGE 64
DELETE: KOK from North Pacific East, Los Angeles, California

DELETE: NMQ Long Beach, CA and NMW Astoria, OR from USA Section.

PAGES 67 - 70
DELETE: All Frequencies for 0030 WLO and Replace with the following:
FREQUENCY: 4257.5, 6446, 8474.5, 12704.5, 17172.4 and 22320.

ADD:
TIMES: 0130; 0930; 1530 (F) 4285, 6491.5, 8440, 12874, 16948.5, 22387; 2030 (F) 4285, 6491.5, 8440, 12874.
PRODUCT: S,F
AREA: Nova Scotia Coastal and Offshore Waters.
FREQUENCY(F): 4285, 8440, 6491.5
SOURCE: VCS, Halifax, NS, Canada
FIG: 9

DELETE: Entire entry for 1230 WLO, Mobile, AL, USA.

ADD:
TIMES: 1400
PRODUCT: F
AREA: Gulf of Mexico and Caribbean Sea.
FREQUENCY: 4257.5, 6446, 8474.5, 12704.5, 17172.4 and 22320.
SOURCE: WLO, Mobile, AL, USA
FIG: 10

ADD:
TIMES: 0530, 1130, 1730, 2330
PRODUCT: F
AREA: Gulf of Mexico and Caribbean Sea.
FREQUENCY: 4352, 8707, 13083.5, 17199.5, 22588.
SOURCE: WLO, Mobile, AL, USA
FIG: 10

ADD:
TIME: 2120
PRODUCT: G,F
AREA: West Central North Atlantic
FREQUENCY: 448
SOURCE: NMN, Portsmouth, VA, USA
FIG: 10
NOTE: 6

PAGES 86 & 87
DELETE: All entries for KOK, Los Angeles, CA, USA.
DELETE: All entries for NMQ Long Beach, CA and NMW Astoria, OR.
CHANGE: 1930 in Time Section to 2000 for NOJ, Kodiak, AK, USA

PAGE 95
REPLACE: NAR with NAR1 under Puerto Rico

PAGE 96
ADD: NOQ7 Panama City, Florida to the United States of America Section following NOQ Mobile Alabama.

PAGES 102 - 112
REPLACE: 2670 A3J in (Frequency Column) to 2671.4 (A3J), 157.1 for 0020 and 1220 for NMY41, Shinneock, NY, USA and 1103 and 2303 for NMK, Cape May, NJ, USA
REPLACE: 2670 (Frequency Column) with 2671.4 for 0420 NMB, Charleston, S. C.
REPLACE: NMR (Source Column), San Juan with NMR1 and, 2670 (Frequency Column) with 2671.4 for the following times:

TIMES: 0305 and 1505
REPLACE: 2670 (Frequency Column) with 2671.4 0350 and 1550 NCF, Miami Beach, Florida.

ADD:
TIMES: 1230 and 2230
PRODUCT: F
AREA: Coastal waters, Jupiter Inlet to Dry Tortugas including the Florida Straits and Offshore waters, Southwest North Atlantic.
FREQUENCY: 157.1
SOURCE: NCF, Miami Beach, FL, USA
FIG: 10
NOTE: 8 & 9
REPLACE: 2670 (Frequency Column) with 2671.4 for 0320 and 1420 NMA21, St. Petersburg and 0420 and 1620 NMB, Charleston.
REPLACE: NMR (Source Column), San Juan with NMR1 for 1210 and 2210.
REPLACE: 2670 (Frequency Column) to 2671.4 and NMG (Source Column) to NMG2 for 1035, 1235, 1635 and 2235, NMG, New Orleans, LA, USA.
REPLACE: 2670 (Frequency Column) to 2671.4 for 1020, 1220,1620 and 2220 NOQ, Mobile, AL, USA and 1005, 1205, 1605 and 2205, 1605; and 2205 NOQ7, Panama City, FL, USA.

ADD:
TIME: 1200 and 2200
PRODUCT: F
AREA: Coastal waters, Little River Inlet to St. Augustine.
FREQUENCY: 157.1
SOURCE: NMB, Charleston, S C, USA
FIG: 10
NOTE: 8

DELETE: Entire entries for 1035 and 1635, NMA21, St. Petersburg.
ADD:
TIME: 1300 AND 2300
PRODUCT: F
AREA: Coastal water, Key Largo, to Apalachicola including Florida Straits and east.
FREQUENCY: 157.1
SOURCE: NMA21, St. Petersburg, USA
FIG: 10
NOTE: 8

REPLACE: 2670 (Frequency Column) with 2671.4 for 1620, NMB, Charleston.
REPLACE: 2670 (A3J) in (Frequency Column) for 0103, NMN37, Fort Macon; 0133, NMN13, Cape Hatteras; 0203, NMN80, Hampton Roads; and 0233, NMN70, Chincoteague with 2671.4(A3J)
REPLACE: All Frequencies for 0400, 0530 and 1000, NMN, Portsmouth to 4430.1(A3J), 6507.8(A3J) and 8766.8(A3J); 1130, 1600, 2200 and 2330 NMN, Portsmouth to 6507.8(A3J), 8766.8(A3J) and 13114.6(A3J); and 1730, NMN, Portsmouth to 8766.8(A3J), 13114.6(A3J) and 17308.7(A3J).
REPLACE: 1240 in (Time Column) with 1233, and 2670(A3J) in (Frequency Column) for NMN37, Fort Macon with 2671.4(A3J)
REPLACE: 2670(A3J) in (Frequency Column) for 1403, NMN70, Chincoteague; 1303 NMN80, Hampton Roads; and 1333 Cape Hatteras with 2671.4(A3J)

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ADD: (Seasonal April 1 through October 15) to area section for 0200 KCI98, King Salmon AK, USA
DELETE: Entire entries for 1000 and 1500 for KGD58 Annette, AK; 0400 and 1800 for WBH29, Kodiak, AK; 0330 and 1600 for KGD91, Yakutat, AK; 0800 and 2200 for KCI95, Cold Bay, AK and 2000 for KCI98, King Salmon, AK.

ADD:
TIMES: 1200, 2145
PRODUCT: S, F
AREA: Alaskan coastal waters, area 1 and Gulf of Alaska.
FREQUENCY: 4125
SOURCE: KGD58, Annette, AK, USA
FIG: 17

ADD:
TIMES: 1300, 2200
PRODUCT: W,F
AREA: Gulf of Alaska
FREQUENCY: 4125
SOURCE: WBH29, Kodiak, AK, USA
FIG: 17
NOTE: 18

ADD:
TIMES: 1430, 0030
PRODUCT: S, F
AREA: Alaskan coastal waters, areas 1 and 2, Gulf of Alaska.
FREQUENCY: 4125
SOURCE: KDG91, Yakutat, AK, USA
FIG: 17
ADD:
TIMES: 0130, 1530
PRODUCT: S, F
AREA: Alaskan coastal waters, areas 3, 5, 6, 7, 8, 12, and 13. (Broadcasts on 2512, April 1 - October 15 and on 4125, October 16 - March 30).
FREQUENCY: 2512, 4125
SOURCE: KCI95, Cold Bay, AK, USA
FIG: 17

ADD:
TIME: 1600
PRODUCT: S, F
AREA: Alaskan coastal waters, areas 5, 6, 7, and 8. (Seasonal April 1 - October 15)
FREQUENCY: 4125
SOURCE: KCI98, King Salmon, AK, USA

ADD:
TIME: 1615
PRODUCT: S, F
AREA: Coastal waters, Pt. Conception to Mexican Border.
FREQUENCY: VHF Ch 22
SOURCE: NMC6, Monterey, CA, USA
FIG: 19

PAGE 180
REPLACE: Area Section for 0030 and 0630 AXM, Canberra, Australia with the following:
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.

ADD:
TIME: 0045
PRODUCT: W(18)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

REPLACE: Area Section for 0130 and 0230 AXM, Canberra, Australia with the following:
AREA: 10°S, 90°E; 10°S, 170°E; 55°S, 90°E; 55°S, 170°E.
REPLACE: Area Section for 0145 AXM, Canberra, Australia with the following: S of 0°; 70°E; 0°, 150°W.
REPLACE: 43°S in Area Section for 0245 AXM, Canberra, Australia to 42°S.

ADD:
TIME: 0330; 0430 (P) P(00)
PRODUCT(P): A(00)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 0045
PRODUCT: P(00)
AREA: 5°N, 52°E; 5°N, 128°F; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia
CHANGE: W(12) in Product Section for 0630 AXM, Canberra, Australia to W(06).

ADD:
TIME: 0645
PRODUCT: W(00)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 0730
PRODUCT: A(00)
AREA: 5°N, 52°E; 5°N, 128°E; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia
REPLACE: Area Section for 0745 AXM, Canberra, Australia with the following: 8°N, 160°W; 7°S, 154°E; 39°S, 8°W; 7°S, 78°W.

PAGE 181
REPLACE: Area Section for 0830, 1430 and 1530 AXM, Canberra, Australia with the following:
AREA: 10°S, 90°E; 10°S, 170°E; 55°S, 90°E; 55°S, 170°E.

REPLACE 43°S in Area Section for 0930 and 1445 AXM, Canberra, Australia to 42°S.

ADD:
TIME: 1015
PRODUCT: P(00)
AREA: 29°N, 96°E; 36°N, 142°E; 42°S, 110°E; 36°S, 157°E.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1030, 1045
PRODUCT: A(00)
AREA: S Hemisphere.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

REPLACE: Area Section for 1115 AXM, Canberra, Australia with the following:
AREA: 23°N, 100°E; 23°N, 180°E; 23°S, 100°E; 23°S, 180° (Tuesday).
REPLACE: Area and Product Section for 1145 AXM, Canberra, Australia with the following:
PRODUCT: W(06)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.

REPLACE: Area Section for 1230 AXM, Canberra, Australia with the following:
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.

ADD:
TIME: 1245, 1330
PRODUCT: P(12)
AREA: S Hemisphere.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1345
PRODUCT: P(00)
AREA: 5°N, 52°E; 5°N, 128°E; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

TIME: 1545; 1645 (P) P(12)
PRODUCT(P): A(12)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1815
PRODUCT: A(12)
AREA: 5°N, 52°E; 5°N, 128°E; 22°S, 0°; 22°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

PAGE 182
REPLACE: Area Section for 1830 and 1845 AXM, Canberra, Australia with the following:
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.

ADD:
TIME: 1930
PRODUCT: WP(12)
AREA: S Hemisphere.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 1940
AREA: S Hemisphere (Summer only).
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

REPLACE: Area Section for 2015 AXM, Canberra, Australia with the following:
AREA: 8°N, 160°W; 7°S, 154°E; 39°S, 8°W; 7°S, 78°W.
REPLACE: Area Section for 2030 AXM, Canberra, Australia with the following:
AREA: 10°S, 90°E; 10°S, 170°E; 55°S, 170°E.

ADD:
TIME: 2045
PRODUCT: P(12)
AREA: 10°S, 100°E; 10°S, 180°; 50°S, 100°E; 50°S, 180°.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

CHANGE: 43°S in Area Section for 2115 AXM, Canberra, Australia to 42°S.

ADD:
TIME: 2130
PRODUCT: P(12)
AREA: 29°N, 96°E; 36°N, 142°E; 42°S, 110°E; 36°S, 157°E.
FREQUENCY: 5100, 11030, 13920, 19690
SOURCE: AXM, Canberra, Australia

ADD:
TIME: 2215; 2230 (P) A(12); 2240 (P) P(00); 2250 (P) P(12)
PRODUCT(P): A(12)
AREA: S Hemisphere.
FREQUENCY: 5100, 11030, 13920, 19690

SOURCE: AXM, Canberra, Australia

PAGE 186
ADD: NMF, Boston, Massachusetts to United States of America Section
PAGE 187
DELETE: South Pacific Ocean, Australia, AXM, Canberra

PAGE 189
ADD: 16. Broadcasts subject to delay.

PAGE 190 - 191
REPLACE: Frequency 13020 to 13021 for 0200 and 1700 NMF, Boston, MA, USA
ADD:
TIMES: 0500, 1100, 1700, 2300
PRODUCT: F
AREA: New England Waters.
FREQUENCY: 518
SOURCE: NMF, Boston, MA, USA
FIG: 10
NOTE: 16

DELETE: All entries for SXM, Canberra, Australia

The Editor's Desk

LOG EDITOR RETIRING

Elwyn E. Wilson (fig. 17a) editor of the Mariners Weather Log, is retiring after nearly 14 years at the helm. "Earl" has been the editor longer, by far, than anyone else. Despite his success with the Log, Earl considers his proudest accomplishment convincing Mary Theresa Fitzgerald to become his wife almost 40 years ago. This liaison has resulted in a son, Steve, and a daughter, Linda. A little more than a year ago Linda presented the Wilson's with a grandson.

Earl earned a Master of Science degree in meteorology from St. Louis before he retired from The U.S. Air Force in 1970. After a brief stint with NOAA's satellite program, he came to the Marine Branch in 1972. Earl's first issue of the Log appeared in January, 1973. Over the years he has upgraded the publication. Earl introduced a more technical weather summary, including the use of upper air climatology in describing the weather of the month. He also streamlined the smooth and rough logs into one well-written summary. Other improvements include the introduction of the ship weather reporting tables and the summaries of buoy data.

Perhaps Earl's greatest contribution was his successful effort in saving the Mariners Weather Log when it was threatened by budget cuts a few years ago. A recent letter from Noble and Denton was a tribute to the success of Earl's tenure. This excerpt sums it up: "It is not that it is a good publication. It is the best in the world for reporting on marine weather and marine weather-related news."

Earl and Mary plan to settle in the St. Louis, Mo. area to be near both families. We here at NODC and I'm sure his many readers wish them well and thank Earl for keeping alive a tradition that began in 1957-- The Mariners Weather Log.

Figure 17a.--Earl is caught contemplating retirement in a rare relaxing moment.

NDBC TROPICAL STORM OBSERVATIONS

CORRECTION: The article, "NDBC Tropical Storm Observations," published in the last issue, Winter 1986, failed to include acknowledgement to the Minerals Management Service for funding drifting buoy 42501.

EFFECT OF ARCTIC HAZE ON CLIMATE TO BE STUDIED

Researchers from the United States and four other nations investigated dense layers of pollution in the skies over the Arctic during March 1986, to identify better how it travels and its long-term effects on the global climate.

Each winter the Artic skies become streaked with layers of pollutants from Eurasian and Soviet sources, and perhaps from North America.

Starting late in December, a haze hangs over the area, peaking in March and April, then disappears for a year. Computer models indicate the haze heats the atmosphere by absorbing solar radiation and preventing infrared radiation from escaping.

Three years ago Russell Schnell of NOAA led the first intensive airborne study of the haze. He found pollution greater than anticipated, more widespread, and reaching to 18,000 ft.

This year's study, which started March 18, will seek answers to questions from the 1983 expedition. Four research planes obtained air samples and measurements within the haze itself, flying from Anchorage, Alaska; Thule, Greenland; and Ny Alesund, Svalbard, an island north of Scandinavia.

Instruments at monitoring stations on the fringe of the Arctic -- at Point Barrow and Poker Flat, Alaska; Mould Bay and Alert, Canada; and Ny Alesund -- collected and measure samples.

The four participating nations are Canada, Norway, Denmark, and the Federal Republic of Germany.

Other U.S. science groups include the National Center for Atmospheric Research, National Aeronautics and Space Administration and 13 universities.

HIGH POLLUTION CONCENTRATIONS FOUND OFF ATLANTIC COASTLINE

High concentrations of pollutants at two levels in the atmosphere have been found by National Oceanic and Atmospheric Administration (NOAA) scientists as far as 400 mi. off the Atlantic coast.

The Commerce Department agency team, studying nature's ability to carry acid-rain producing pollutants long distances through the atmosphere, investigated the airborne flow eastward from the North American continent last month.

Heavily polluted air masses were found off the coast at altitudes around 3,500 ft. Scientists believe they stemmed from major East Coast cities.

Two NOAA aircraft, operating from bases near Boston and New York, encountered a heavily polluted air mass extending up to 20,000 feet, off Nova Scotia. Investigators believe it came from the stack of a large smelter somewhere in Quebec Province.

Earlier measurements, taken in Ireland, Bermuda and from shipboard, have indicated that some pollutants get carried across the Atlantic. However, results of last month's study indicate that most of the pollutants wash into the ocean during storms, without any ill effects, the scientists said.

GREAT LAKES LEVELS UPDATE, 2 APRIL 1986
US Army Corps of Engineers
North Central Division

All of the Great Lakes continue to be dangerously high and have begun their seasonal rises. Lakes Superior, Michigan-Huron, St. Clair and Erie have again all set new monthly record high levels in March. For Lakes Superior and St. Clair, this is the seventh straight month that record highs have been set; for Lakes Michigan-Huron, it is the sixth; and for Lake Erie, it is the fifth. The Lake Ontario level is well above normal.

The attached bulletin shows our projected levels for the period April 1, 1986, through September 30, 1986(fig. 17b). All the upper Great Lakes are predicted to remain extremely high for the next six months. The Lake Superior March monthly mean level was 601.17 feet, which is 2.4 inches above the previous March record of 600.97 feet, set in 1975. Lakes Michigan-Huron's March level was 580.43 feet, 5.4 inches above the previous record of 579.98 feet that was set in 1973. Lake St. Clair's level was 3 inches above its previous record March high level of 575.90 feet that was set in 1985. The Lake Erie level was 573.16 feet which was 3.4 inches above its previous record March high level 572.88 feet that was set in 1973. Continued high inflows from upstream and the local basin runoff in March caused the Lake Ontario level to remain at 245.75 feet, or about 16 inches above normal.

The International Joint Commission (IJC) is directing the outflows for the two Great Lakes that are regulated. Lake Superior is at its Regulation Plan 1977 outflow setting. Lake Ontario is being regulated under Criterion (k), which requires that it be regulated so as to provide all possible relief to riparians upstream and downstream of the St. Lawrence River control structures. As a result, the IJC's St. Lawrence River Board is maximizing the Lake Ontario outflows while accommodating the spring freshet into the St. Lawrence River from the Ottawa River which is downstream near Montreal.

The outlook is for all the lakes except Lake Ontario to remain near or above record high levels at least through September 1986. With spring weather here and the ice covers dissipating, there is concern that severe storms acting on the record high levels can cause serious damage to shoreline properties. Riparian property owners should be alert to take necessary precautions.

The Corps of Engineers has authority under Public Law 84-99 to carry out preventive work prior to a flood threat to life and improved property. This program, known as Advance Measures, is applicable to areas threatened with inundation and was initiated on the Great Lakes early in 1985 at the request of the Governors of Michigan and Ohio to counter the threat presented by the high Great Lakes water levels. The program is underway at a number of sites in these states. There is no similar authority applicable to shore erosion threats.

In Michigan, five projects are now substantially complete at Luna Pier, Estral Beach, Detroit Beach in Frenchtown Township, and Labo Island and Milleman in Brownstown Township. In Ohio, four projects have been approved; Reno Beach/Howard Farms, Whites Landing, Eastlake and Bayview. Only the Bayview project is under

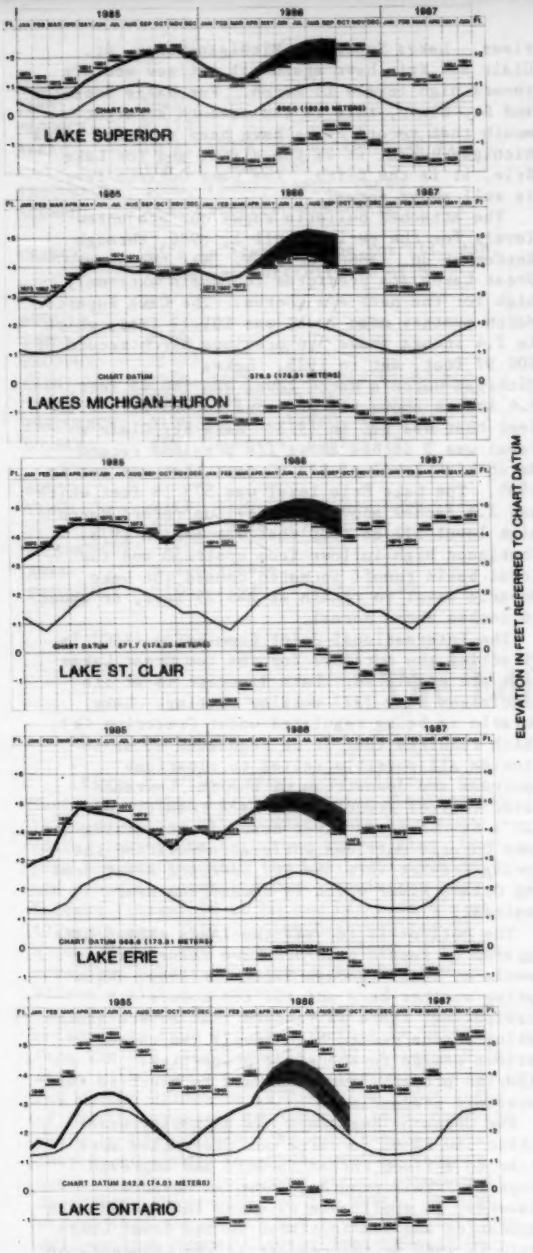

Figure 17b.--Charts show recorded levels for previous year and current year as well as projected levels. These are compared to the average and extreme levels.

construction. All other potential projects in both states either are ineligible or have been declined by the communities except for eight locations which are being reconsidered. Investigation of potential advance measures is also underway in New York on Lakes Erie and Ontario as the result of a request from Governor Cuomo.

The Corps is also authorized to assist local communities in responding to actual flooding situations. This includes providing technical assistance, supplies and equipment and contracting, as necessary, to supplement maximum states and local efforts. Requests for assistance should be directed through the local and state disaster assistance agencies.

For Great Lakes basin technical assistance or information, contact one of the Corps of Engineers District Offices.

The "Help Yourself" brochure which contains information on shoreland damage causes and some protective measures is available from the District Offices.

NEW LOG EDITOR

Dick DeAngelis (fig. 17c) will become the ninth editor of the Mariners Weather Log in its 29-yr history. Dick joined the original Marine Branch back in 1966, after working for the Weather Bureau at Washington National Airport. In addition to originating and writing the Hurricane Alley column for the Log, he has penned more than twenty articles. He also served as assistant to the Chief of the Marine Branch under Art Cooperman. Dick has written the climatology sections for the DMA Sailing Directions/Planning Guides and for the NOS Coast Pilots. He has degrees from the State University of New York and St. Louis University, as well as graduate work in statistics at George Washington University.

Figure 17c.-- Like Earl, contemplating retirement, but 10 yrs down the road.

MARINE WEATHER REVIEW

The Weather Logs combined with the cyclone tracks, U.S. Ocean Buoy climatological data, gale and wave tables, and mean pressure patterns are a definitive report on the weather systems and primary storms which affected the North Atlantic and North Pacific Oceans during this 3-mo period. Hurricane Alley lists and describes tropical cyclones worldwide. Unless stated otherwise, all winds are sustained winds and not gusts; all times are G.M.T.

North Atlantic Weather Log

October, November and December 1985

Weather Log,October 1985--There was no on concentrated cyclone path this month. The greatest concentration of storm centers was north of latitude 50°N. There were two anomalous storms south of the Azorers, two near Cape Hathers and three that formed off the New England coast. Early in the month, the storms north of 50°N tracked over the eastern ocean and tracked over western ocean the last half of the month.

The Icelandic Low was 998 mb at 60°N, 40°W monthly mean sea-level pressure chart, (fig.18). This was 3 mb lower and 300 mi east of the climatic mean. There was a wide departure from climatology in the subtropical Highs. Climatology shows a 1018 mb High over West Virginia and 1019 mb High south of the Azores. This month there was a 1026 mb High center near Prague with a 1021 mb subcenter west of Portugal. On the U.S. side there was a 1022 mb High center near 33°N, 60°W and a 1021 mb center over Delaware Bay.

There were three significant sea level pressure departure centers. The negative one was minus 5 mb associated with the Icelandic Low, over 58°N, 38°W. A plus 9 mb center was over the North Sea east of London. It covered a large area east of 30°W and south of 70°N. Another positive area was 5 mb centered near 32°N, 60°W and included the northeast U.S.

At the 700 mb surface there was an anomalous Low over southern Greenland from which a deep trough stretched south along 40°W. The wind flow over and off eastern North America was nearly zonal. East of 40°W the winds turned northeastward into a ridge along 10°E.

Tropical cyclones Isabel and Juan occurred this month.

Some Climatology. On October 4, 1869 a severe storm struck New England with strong winds, high tides, and heavy rains. Supposedly the storm was predicted 12 months in advance by a British officer named Saxby. The journal of John Winthrop records that a mighty tempest struck New England on the 5th in 1638. This second hurricane in 3 yrs blew down many trees. On the 7th in 1970 indespread flooding occurred in Puerto Rico from a slow moving tropical depression. Rainfall for the day was up to 17 in. Total rainfall averaged 30 in the eastern interior with 38.4 in at Jayuya.

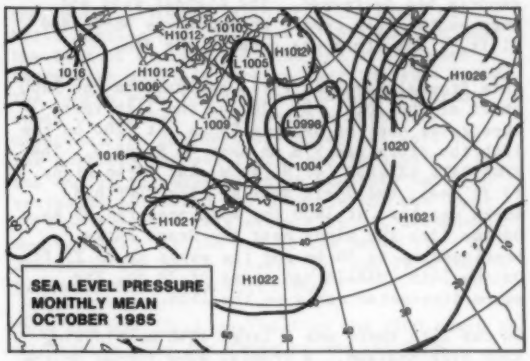

Figure 18.-- Monthly mean sea-level pressure.

Extratropical Weather--The month began with extratropical Gloria over the north central ocean and was described in the September Weather Log. There was high pressure over the eastern. United States, the subtropical ocean, and Europe. A new storm was over the shipping leaves the middle of the week. At the end of the week high pressure dominated south of 45°N from Russia to the Mississippi. There was three LOW's along 60°N that made up a large cyclonic circulation.

The cyclones weakened the first part of the second week and the HIGH's broke into multiple cells. As the week progressed low pressure penetrated further south. At the end of the week there was a large blocking HIGH centered over England which persisted into the third week.

On the 15th there was only one significant LOW over the water. A flat high pressure area covered the western ocean. By midweek high pressure was dominate except for a large LOW over the Labrador Sea. The end of the week a weak cyclone stretched south from Greenland. The fourth week there was a large 1041 mb HIGH over northern Europe. Except for low pressure over the Denmark Strait high pressure was the main feature. At midweek another double centered LOW stretched south from Greenland. Hurricane Juan was over the Gulf of Mexico. At the end of the month high pressure persisted

over Europe with a storm moving across the midlatitudes.

On the 3d a week LOW was northern Labrador. It moved southeastward, then eastward and northeastward through and with a trough. By 1200 on the 4th there were a few gales and waves up to 20 ft. At 1200 on the 5th the storm was 970 mb near 58°N, 27°W. There were several observations of 45-kn winds and one of swell waves of 33 ft. The SEA-LAND PRODUCER(44°N, 26°W) had 45-kn winds. The PALEKH (55°N, 35°W) measured 33-ft swells. On the 6th CHARLIE reported 26-ft swells. The DART ATLANTICA (49°N, 25°W) had 30-ft swells there were many gale and strong gale reports, particularly over the North Sea. By 1200 on the 7th the storm was in the Norwegian Sea and weakening. The gale reports had decreased. The highest wind and wave on the ship report printout was 46-kn and 21 ft. The storm was gone on the 8th.

This frontal wave was first analyzed on the 1800 chart of the 10th. By 1200 on the 11th there were gales east of Georges Banks. At 1200 on the 12th the storm was 976 mb near 46°N, 46°W. The STUTTGART EXPRESS (47°N, 49°W) had 52-kn winds, 13 ft seas, and 26-ft swells. The VCNP had 48-kn nearby. At 1800 the WGZL measured 55 kn. On the 13th the winds near the Grand Banks continued up to 50 kn and the waves up to 25 ft. On the 14th CHARLIE had waves of 20 ft. The storm dissipated early on the 15th.

On the 14th there was a large 1040 mb blocking HIGH over England. A frontal wave formed on the front out of the storm described above near 44°N, 35°W. There were 20-ft swells west and south of the center. By 1200 on the 15th the storm was 972 mb and had passed nearby directly over CHARLIE an hour earlier (fig.19)CHARLIE measured 43-kn winds and 21-ft seas. The CAST HUSKY (51°N, 30°W) had 50-kn winds and 20-ft seas. On the 16th the storm was east of Kap Farvel. The WALTHER HERWIG (62°N, 41°W) had 50-kn north winds and 23-ft seas. Another ship at 61°N, 30°W had 26-ft seas.
The storm was weakening on the 17th and disappeared by the 18th.

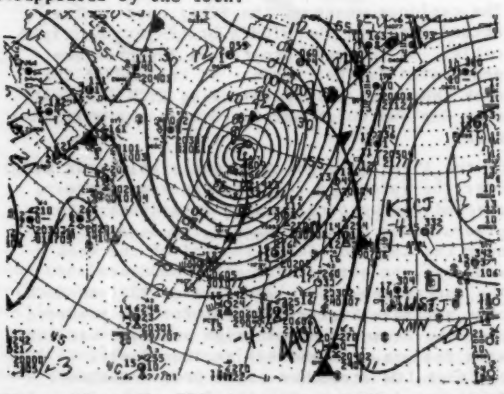

Figure 19.-- The 972 mb storm at 1200 on the 15th.

This was an Arctic Ocean storm. It developed near Jan Mayen Island on the 14th. It moved eastward and underwent explosive deepening--20 mb in 24 hrs to 978 mb at 0000 on the 16th. A RIGG near 72°N, 20°E measured 49-kn west winds. The HOGSTERFJORD (74°N, 23°E) had 44-kn northwest winds and 25-ft seas. At 1200 on the 16th the storm was 964 mb near 72°N, 45°E (fig.20). The KOMSOMOLETS TATARII (71°N, 29°E) had 52-kn north winds and 36-ft seas. Another ship had 54-kn winds and 20 -ft seas. Others had strong gales.

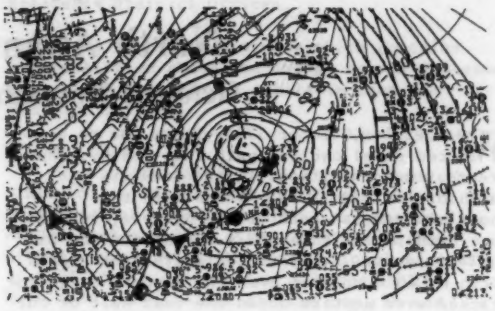

Figure 20.-- The violent Polar storm on the 16th.

A news report indicated that dozens of buildings were damaged and communication disrupted on the Kola Peninsula. The winds were measured up to 82 kn on the coast and at Murmansk. At 1200 on the 17th the storm was 972 mb at 69°N, 50°E. There were no more reports available.

This LOW developed in a trough near James Bay on the 15th. It crossed the Labrador Coast late on the 16th as a fully-developed storm. On the 17th there were gales over the Grand Banks. The 17th there were gales over the Grand Banks. The SEDCO-BP471 (53°N, 50°W) had 21-ft seas. The ACHILLES (51°N, 37°W) had 40-kn south winds and 20-ft seas. On the 18th CHARLIE had 25-ft seas. The storm was stationary near the Denmark Strait and dissipated on the 20th.

Casualties-- These vessels had fog problems. The EVERHOPE struck a catwald on the 6th at Brunsbuttel. The HORNBELT and ALGOL collided in the Elbe on the 29th and the former sank. The KARNAN and URSULA collided in the harbor of Helsingborg on the 3d. The RAGNA GORTHON and GABRIELLA collided on the Kiel Canal on the 6th. The drilling platfrom DYVI EPSILON broke loose from the STAD SUPPLIER and drifted for 24 hrs on the 12th to 13th in the North Sea in winds reported to gust to force 12.

These ships reported heavy weather problems: The ALMIRANTE, HANNA MARJUT, HERCULES, LADY KAREN II, LLOYD SANTOS, OCEAN HARVEST, PAULIS, RIO LOS PALACIOS, and WERDER BREMEN.

Other Casualties-- The FRANCOISE sustained damage in the River Plate on the 22nd. The JOSE SANTOS GUARDIOLA sank in heavy weather off Honduras late in the month. All the crew were rescued.

WEATHER LOG, NOVEMBER, 1985-- The storm paths this month did not follow climatology. These also appeared to be fewer significant cyclones than a normal November. Except for one cyclone the last week of the month that moved eastward from north of the Asores into Spain all the storms that moved east of longitude 20°W were in the first week. The cyclones over the central ocean during the last half of the month circled and looped. The storms crossing the East Coast were widely dispersed north and south.

The monthly mean sea-level pressure chart vastly differed from climatolgy (fig. 21) The Icelandis Low at 1007 mb higher than normal and at 53°N, 38°W was about 600 mi south-southwest of its normal location. A ridge of high pressure with centers near the North Pole, Iceland, and Bilboa separated the Icelandic Low and its 1006 mb partner near Lofoten, Norway. The primary high pressure center was 1021 mb near Bermuda rather than the Azores. There was a 1019-mb High south of the Azores. Another 1021-mb High was near Quebec. The high pressure extended northwestward across the United States and Canada to a 1028 mb center over the Yukon. There were four significant anomaly centers, a large minus 8 mb near 46°N, 36°W and three positive centers, a plus 9 mb near the Faeroe Islands, a plus 7 mb north of Quebec and a plus 4 mb near Bermuda.

The upper-air long-wave pattern at 700 mb was shifted considerably. There was a ridge over the east coast of North America rather, than the usual trough. There was trough along longitude 40°W instead of the usual slight ridge, and a sharp ridge along longtitude 15°W with a trough over Central Europe.

Hurricane Kate occurred this month over the Gulf of Mexico.

Some climatology-- On November 1, 1861 a hurricane passing Cape Hatteras battered a Union fleet attacking Carolina ports. On the 9th, 1913 a rapidly deepening cyclone struck the Great Lakes. Eight ore carriers on Lake Huron sank drowing 270 sailors. Cleveland had 22 in of snow and the winds averaged 50 mi/hr with gusts to 79.

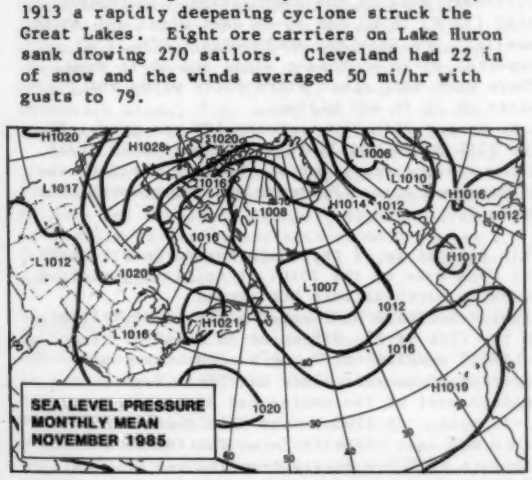

Figure 21.-- Monthly mean sea level pressure.

Extratropical Weather-- The month started with the normal pressure systems reversed. There was high pressure over the 55° to 65°N latitude band, a large cyclone with several weak centers along 40°N and a very weak HIGH at 20°N. A severe LOW was over Norway. By midweek the pattern was changing. There was still a HIGH over Quebec but a LOW was now south of Iceland. At the end of the week the HIGH over Quebec was moving southeastward and the Azores High was centered near Gibraltar. A severe storm had moved across Scotland to Scandinavia.

The second week there was a storm over the northeastern ocean and a ridge of high pressure along longitude 45°W. The high pressure drifted eastward and dominated the ocean until the end of the week.

Early in the third week strong LOW's moved across the northern latitudes as Kate formed in the south latitudes. High pressure moved off North America and there was a 1056 mb HIGH over the Gulf of Finland. At the end of the week there were multiple centers over the salt water. The fourth week found high pressure centered south of Iceland. Two cyclones were over midocean. The southern one moved eastward and the northern one was forced northwestward. By the end of the week the high pressure had retreated northward and a severe LOW was south of Kape Farvel. This storm circled, deepened, and expanded. At the end of the month it dominated the ocean between 25° and 70°N and Newfoundland to the North Sea.

This LOW was first analyzed on the 1200 chart of 31 October near Jan Mayen Island. At 0000 November 1 the winds were measured at 40 kn. At 1200 the storm was 978 mb near Lofoten,Norway. At 1800 a USSR, ship at 66°N, 04°W had 50 kn winds and 26-ft seas that continued into the 2d. There were many gale and strong gale reports. The SEAGAIR (62°N, 01°E) reported 45-kn winds and 39-ft sea and swell. At 0600 on the 2d her winds were 52 kn and the seas 49 ft. Other platforms were reporting 33 ft. At 1200 the GCLC reported 39-ft seas. The GWYN sank after her carho shifted in rough seas off Borkum. Late on the 3d the storm had moved far enough inland and it no longer affected the offshore area.

This was a cyclone system with multiple centers. On the 3d there were three primary LOW centers and several secondary centers that stretched from Scandinavia to about 40°N, 45°W. Large high pressure areas were on the northwest and southeast sides. On the 4th it was a large elongated circulation that had reverted to frontal waves. Most of the high winds and waves were on the northwest side of the front. The SALMON POOL (47°N, 38°W) had 50-kn east winds and 26-ft waves. Most of the higher winds were gale to strong gale and waves were 20 to 25 ft.

On the 5th the storm broke into two major centers, one over the North Sea and the other at 38°N, 37°W. The higher winds were now around the northern center over the North Sea. The KIRKELLA (54°N, 00°) reported 55-kn west winds with 23-ft seas. The SEAGAIR (62°N, 01°E) had

60-kn north winds and 43-ft waves. There were many reports of storm-force winds and waves over 20 ft. These continued into the 6th.
The southern center was rapidly deteriorating and the northern center moving into the Barents Sea.

There were many marine casualties from this storm. Denmark was particularly hard hit with winds gusting near 100 mi/hr. These vessels either broke moorings, ran aground, were swamped, sank, or other damage due to winds and waves; LONGBOW, MAERSK WORKER, THAROS, SEABOARD INTEGRITY, PAULINE S, STAVSKJELL, DUSSELDORF EXPRESS, PAPUA, COMMUNICATOR, MIRANDA, FJELLHAV, SURREY and TOR SCANDINAVIA.

This potential storm formed over the Labrador Sea on the 6th, tracked eastward and deepened. By 1200 on the 7th it was 980 mb near 55°N, 30°W. Gales were already blowing and CHARLIE measured 45 kn north winds with 18-ft seas. The FJORD RANGER (49°N, 41°W) had 25-ft swells. At 0000 on the 8th CHARLIE still had 45-kn winds with 26-ft seas. At 1200 the DART AMERICA (52°N, 33°W) found 50-kn north winds and 30-ft waves. The ATLANTIC STAR (49°N, 36°W) had 33-ft waves. LIMA measured 52 kn with 20-ft seas, while ROMEO reported 43-kn southwest winds and 33-ft waves. At 1500 on the 8th and 0000 on the 9th ROMEO reported 45-kn winds and 46-ft waves. LIMA now had 30-ft waves. At 1200 the storm was 964 mb near 59°N, 04°E (fig.22). There were many reports of high swell waves. The GRAND ENCOUNTER (51°N, 17°W) had 55-kn winds and 33-ft swells. The NOSIRA MADELINE (53°N, 24°W) also had 33-ft swells. On the 10th the storm was over the Gulf of Bothnia and the winds over the north and Norwegian Seas dropped quickly.

These vessels appeared to have suffered heavy weather damage in this storm. They were the ANNE (aground), COMBI SPIRIT (cargo shifting), DURRINGTON (damage), and NIVA (cargo shift).

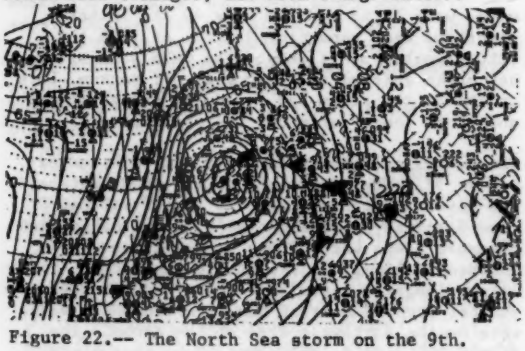

Figure 22.-- The North Sea storm on the 9th.

Another Labrador Sea storm that formed off Goose Bay on the 13th. At 1200 on the 14th the storm was 980 mb near Savoy 44611. The winds were generally in the gale category but the ABBEY found 50-kn winds, 23-ft seas, and 33-ft swells at 1800. The waves had built rapidly. The DART ATLANTICA (48°N, 29°W) reported 23-ft seas and 49-ft swells. The storm was 966 mb at 1200 on the 15th near 65°N, 35°W and turning westward toward Greenland. At 0600 the DART ATLANTICA had 33-ft seas and 59-ft swells. The PROTEKTOR (58°N, 20°W) reported 60-kn winds from 160°, no waves and the winds were still 60 kn at 1200. The KONSTANTINE OLCHANSKII nearby also reported 60-kn winds with 26-ft seas. As the storm center crossed into Greenland it was 956 mb and there were still some 50-kn winds. The storm rapidly deteriorated over the ice cap.

This storm came out of the Midwest and moved off the New England coast on the 15th. It immediately started to intensify. The WHITE CASCADE (39°N, 57°W) had 44-kn southwest winds at 1800. At 0000 on the 16th the SEDCO 710 (46°N, 49°W) measured 50-kn south winds. At 1200 the storm was 970 mb near 52°N, 39°W. At 0600 the HUDSON (46°N, 47°W) reported 70-kn southwest winds and 30-ft seas. The WGZL (47°N, 49°W) had 65-kn northwest winds. At 1200 the ATLANTIC CONVEYOR (47°N, 38°W) reported 60-kn winds, 33-ft seas, and 39-ft swells. The storm was 956 mb at 64°N, 31°W at 1200 on the 17th. The GRONLAND (60°N, 27°W) reported 60-kn winds and 33-ft swells. The SNORRI STURLUSON and VIDEY both near 63°N, 24°W both reported 68-kn winds but no wave height. The storm was over the Denmark Strait on the 18th and weakening.

At the beginning of the last week of the month there was a blocking HIGH over 10°W. A cyclone that moved east over Newfoundland was diverted southward. It weakened and a new cyclone formed nearby on the 22d and tracked northward. On the 23rd there wave three centers within the circulation. The NOSIRA SHARON (49°N, 21°W) had 55-kn southeast winds, 33-ft seas, and 25-ft swells. Other ships in the area were reporting 40 to 52 kn and 20-to 26-ft waves.
On the 24th the southern LOW moved eastward and the northern LOW warm tracking northwestward. Most of the highs, winds and waves were on the northeast side of the circulation. The SHOKO MARU (57°N, 28°W) had 56-kn east winds and 30-ft swells. The SEA-LAND ADVENTURER (49°N,22°W) reported 65-kn southeast winds and 49-ft seas. There were many other storm-force winds and waves of 30 ft and higher.
Late on the 24th the northern LOW was gone. On the 25th ROMEO had 36-ft seas. There were still a few storm-force reports. Late on the 26th the storm moved across Portugal and disappeared over Spain.

This last storm of the month formed in a trough off Cape Race on the 26th. It originally started tracking northeastward but curved counterclockwise and looped south of Kap Farvel. On the 27th it was 978 mb at 53°N, 40°W. The ATLANTIC COMPASS (51°N, 40°W) near the center reported 60-kn west winds and 33-ft swells. CHARLIE east of the center had 35-kn winds and 23-ft seas. At 1200 on the 28th the 978 mb storm was east of Belle Isle. The FARNES with a pressure of 978.4 mb was near the center with 60-kn northeast winds and seas received as code 40 and swells as code 35 (66 and 57 ft). Other ships were reporting gales to strong gales and waves 20 to 26 ft but were many miles away from the storm center. At 1200 on the 29th the storm had consolidated into a 965 mb center and its

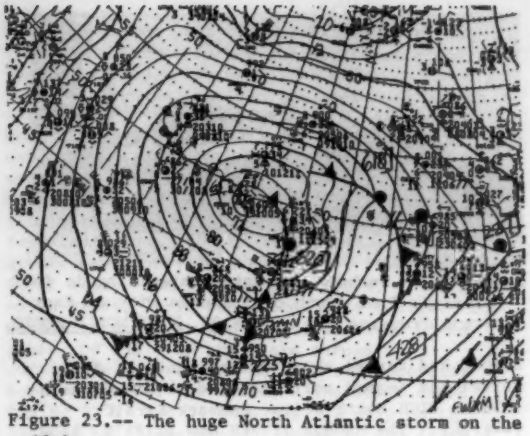

Figure 23.-- The huge North Atlantic storm on the 29th.

circulation stretched from Newfoundland to Ireland and Kap Farvel to latitude 30°N (fig.23) The ATLANTIC CONCERT (45°N, 54°W) reported 58-kn winds. The FULGUR (50°N, 42°W) had only 37-kn north winds but the seas were 25-ft with supposedly 57-ft swells (code 35). The W.C. VAN HORNE (58°N, 44°W) had 50-kn winds from the northeast and were still 50-kn on the 30th. There were many storm-force winds and waves of 20-ft and over. The FARNES (51°N, 39°W) had northeasterly 37-kn winds, 33-ft seas, and 36-ft swells. The TFL DEMOCRACY (42°N, 42°W) reported 48-kn northwest winds, 13-ft seas and 33-ft swells. The storm was quasistationary near 50°N, 33°W.

On December 1 the JOHAN PETERSON (61°N, 20°W) had 60-kn winds and 33-ft seas. The AMERICAN ENVOY (38°N, 44°W) had 45-kn winds, 15-ft seas, and 30-ft swells. For 1200 alone there were three 11x14 computer printout sheets with observations above 34 kn. On December 2 the storm was weakening and a frontal wave moving through the eastern part of the storm. The OVERSEAS MARILYN (51°N, 40°W) measured 63-kn northwest winds, 7-ft seas, and 43-ft swells. The storm was no longer significant on the 3d.

These vessels had a bad encounter with this storm: BAGHDAD (containers damaged and overboard), BLACK PRINCE (bridge window cracked by wave and equipment damage), VIBEKE CLIPPER (container shifted), and APEX PIONEER towing BURBANK VICTORY and THUBAN (all three damaged and the THUBAN sank).

Casualties-- The WODNICA and BALTIYSKIY collided in fog in Holtenau harbor on the 15th. The ARGOLIKOS grounded in fog in the St Clair River on the 26th. The AMYNTAS had ice damage off eastern Canada.

The BRIDGE BUILDER II broke moorings and beached on Long Island on the 4th. The RONA capsized and sank after her cargo shifted. The GROTON had weather damage on the 14th. The IONION and OCEANIS colided in heavy weather on the 24th. See the individual storms for other casualties.

Other Casualties-- The IRAN JOMHURI ran aground in Bahia Blanca Roads.

The JOHN BISCOE was abanboned in pack ice and the 64 crew and expedition members were transfered to the POLAR DUKE.

The POLARSTERN wided in breaking the JOHN BISCOE out and some crew members returned to sail her out of the ice.

WEATHER LOG, DECEMBER 1985-- the cyclone tracks over water were concentrated along and to the north of the major shipping lanes. Their general orientation was northeastward but remaining slightly south of the normal position of the Icelandic LOW. Cyclonic activity was light along the U.S. East Coast , but a couple of storms did develope east of Cape Hatteras. Several LOW's moved across the Great Lakes, mainly during the first half of the month.

The gross mean sea-level pressure chart did not differ greatly from the normal pattern but the pressure centers were offset and more intense (fig. 24). The 995 mb Icelandic Low was 5 mb deeper at 56°N, 45°W and 550 mi southwest of its normal location. A 1001 mb secondary Low normally over the Norwagian Sea was over northern Norway. The ridge and high pressure center over the Greenland Icecap was 1023 mb, 8 mb higher than normal. The Azores High was 1024 mb, with the primary center shifted in the southwest. The high pressure area near the North Pole was 1036 mb about 20 mb higher than normal with a 1030 mb center over southern Idaho.

There was several mean sea-level pressure departures from normal centers that were significant to the cyclone center tracks. One was a plus 14-mb anomaly center over the Denmark Strait. The zero isoline paralleled the Greenland west coast than along latitude 60°N and then paralleled the Norwegian Coast. There were two minus 10 mb anomaly centers near the primary ship track, one near 54°N, 50°W and the other near 51°N, 28°W. There was a multicentered plus 5 mb anomaly center over the centered Mediterranean Sea and a plus 5 mb anomaly center was 27°N, 46° W. A minus 9 mb center was near Mansel Island in Hudson Bay. The high pressure over the Pacific Northwest and North Pole was reflected by plus 12 mb and 20 mb centers respectively.

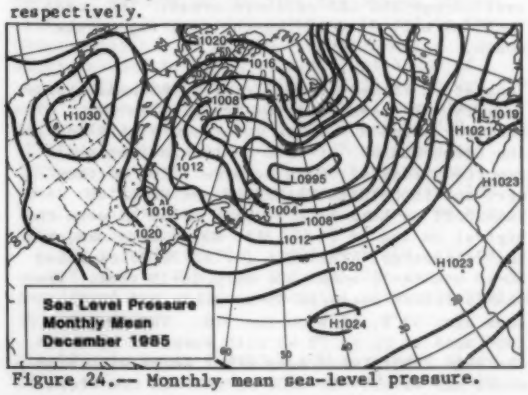

Figure 24.-- Monthly mean sea-level pressure.

The upper-air pattern at 700 mb was primarily zoned over water between latitude 30° and 50°N. There was slight ridging over western Europe. There was an anomalous High over east-central Greenland. The cyclonic circulation center was near normal in height but 900 mi south over Port Harrison, Quebec.

Some Climatology-- On December 9, 1917 a severe storm hit the Great Lakes, producing 2 ft of snow and hurricane-force winds at Buffalo. On the 23d in 1811 a winter storm hit Long Island with a foot of snow and near 0°F temperatures. Many ships were wrecked and some entire crews perished.

Extratropical Weather-- The month began with a large severe storm over the northeastern Atlantic which was described in the November Weather Log. There was abnormal high pressure over Greenland and southern Europe. At midweek the weakening storm broke through between the two HIGH's and another severe LOW was centered over the Labrabor Sea. At the end of the week there was a large Azores High and an elongated LOW off the East Coast.

The second week the above LOW consolidated and intensified south of Kap Farvel at midweek. At the end of the week the storm had broken up and these was a large elongated HIGH from the Azores to Moscow. A large Bermuda High occupied the water east of Florida.

A cyclone that moved along the U.S. East Coast deepened over the Labrador Sea early in the third week (15th). High pressure was centered over France and Spain. At midweek the cyclone had turned northwestward and the ocean south of latitude 50°N was basically under high pressure. A cyclone that moved across the Great Lakes and the Maritime Provinces deepened over St. John's. High pressure occupied the southern half of the ocean. By the end of the week the LOW was an intense storm that continued into the fourth week.

Another LOW was south of Cape Race on the 22nd and intensified as it tracked toward Ireland and was over Europe on Christmas Day. The last of the week high pressure stretched south from the North Pole to the subtropics. The last of the month there were weak cyclones over Europe and the northern ocean. The ocean cyclones were intensifing the last day of the month.

This storm formed in the Texas / Oklahoma storm factory. It moved over the Great Lakes on December 1 and 2. There were some high winds on the Great Lakes. At 1200 on the 2d four ships reported winds of 60 kn or more. Two of them were the INDUSTRIAL TRANSPORT and CANADIAN TRANSPORT on Lake Erie. Winds of 50 kn were the highest on the 3d (fig. 25). Gales were now over the salt water. The WGZL (47°N, 51°W) reported 60-kn southerly winds but only 16-ft seas. The MAGNUS JENSEN measured 65-kn winds and 46-ft seas near 59°N, 45°W on the 3rd. These continued at up to 70 kn with waves of 52 ft on the 4th. There were many other ships with high winds and waves. At 0000 on the 4th the storm was 960 mb off Hebron, Labrador. At 1200 another

Figure 25.-- Onshore superstructure icing is the scenario 5 mi north of Traverse City on East Grand Traverse Bay on the 3d. WIDE WORLD PHOTO.

center had formed about 500 mi south of Kap Farvel and turned northwestward as there was a 1036 mb HIGH north of the Denmark Strait (fig.26). The MAGNUS JENSEN now at 58°N, 47°W still had 62-kn east winds and 44-ft seas. The ALEMANIA EXPRESS (51°N, 44°W) had 52-kn southwest winds and 33-ft waves. The storm weakened on the 6th and about disappeared on the 7th.

On the 7th a multicentered LOW moved northeastward about 600 mi off the East Coast. There were some gales and waves up to 20-ft with this cyclone.

The warm moist air from this cyclone regenerated the old one. At 1200 on the 8th both were 981 mb. The winds were generally gales with waves below 20 ft. One exception was the DKQP (55°N, 46°W) with 60-kn southwest winds and 33-ft seas. At 1200 on the 9th the old LOW was again a major storm at 960 mb, 200 mi south of Kap Farvel. The OCEAN GOLF (50°N, 49°W) measured 65-kn winds and 30-ft seas and swells. On the 10th LIMA had 20-ft seas and CHARLIE had 23-ft swells. The storm covered the ocean north latitude 35°N from shore to shore but on the 11th it started breaking up. The STRATUS probably suffered her weather damage in this storm on the 7th to 9th.

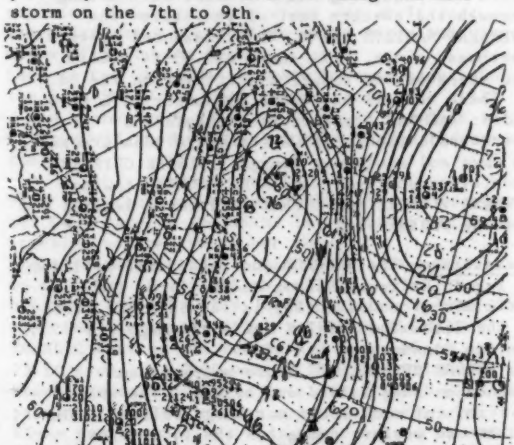

Figure 26.-- The 1200 position of the original and secondary LOWS.

This LOW formed west of Cape Hatteras on the 13th. The storm tracked northeastward along the East Coast and there were some gales on the 14th. At 1200 on the 15th the storm was 985 mb near 51°N, 53°W. The VSBNS (40°N, 61°W) had been fighting 60-kn winds and 33-ft seas for over 6hrs. SEDCO 709 measured 58-kn northwest winds and 21-ft seas at 44°N, 60°W. The BRITISH WYE (42°N, 63°W) found 50-kn winds. On the 16th a group four of reporters near 46°N, 48°W reported an average of 55-kn winds with a deviation of only 1-kn each side. Two reported 30-ft seas. The RAINBOW HOPE (50°N, 47°W) had 45-kn winds, 15-ft seas, and 31-ft swells. The weather station at Kap Farvel reported 65-kn winds. On the 17th the storm turned northwestward. A 1033 mb HIGH near Scoresby Sound deflected the storm. The JUNGE GARDE (50°N, 50°W) had 50-kn winds. A ship north of Iceland had 52-kn winds. As usual the storm quickly disintegrated.

It could have possibly been in this storm that these ships suffered their heavy weather damage. Usually not enough data is known, such as place. They were the A.E.S. EXPRESS, BOXER CAPTAIN COOK, FEDERAL LAKES, JOHN CABOT, and NORA.

The Great Lakes area produced this LOW on the 18th. At 1200 on the 19th the storm was 972 mb near St. John's, Newfoundland, Cape Race reported 50-kn winds. There were high waves east of the storm in the southerly flow, CHARLIE measured 62-kn west winds and 30-ft seas. The VCNP (47°N, 48°W) measured 72-kn winds from 240°and 33-ft seas. The JUNGE GARDE (48°N,48°W) measured 64-kn and 33 ft seas. The 0000 chart of the 20th showed a double LOW and the 1200 chart showed the new LOW had taken over the circulation. There were many high wind and wave reports. At 1200 the storm was 952 mb near 55°N, 37°W (fig. 27). CHARLIE had 62-kn winds and 49-ft seas. The FEDERAL DANUBE measured 47-kn winds and 44-ft seas at 50°N, 35°W. The next report indicated 65-kn winds and 82-ft swells but it is believed that may be a bad transmission or encoding but an observation at 1200 on the 21st indicated 50-kn winds and 74-ft swells.

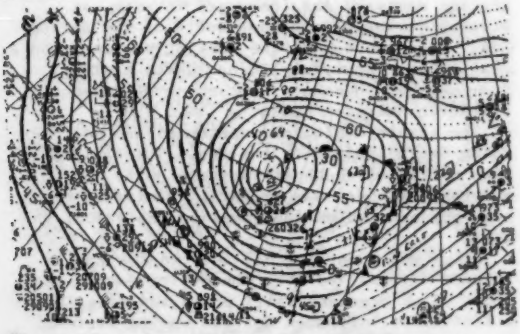

Figure 27.— Rough weather plagues the North Atlantic shipping routes on the 20th.

The AGDE had cargo shift in the English Channel on the 21st. The BISSAYA BARRETO got water on the bridge and was unable to steer on the 20th at 47°N, 43°W. The MOUSTAINA had engine trouble near 50°N, 37°W on the 21st in 60-kn winds. The JOHN CABOT was nearby. The RAVENSCRAIG lost anchors and chain on the 21st and 22d while at Narvik.

This LOW developed in a trough near 39°N, 56°W on the 22d. Moving rapidly eastward then swinging northeastward it deepened to 986 mb by 1200 on the 23d near 47°N, 34°W. Winds south and southwest of the center were running up 45 kn. At 0600 on the 24th the ATLANTIC CONVEYOR encountered 56-kn winds in 36-ft seas near 46°N, 36°W. By 1200 the 965-mb LOW had crossed the 25th meridian near 51°N and had turned eastward. The storm began to weaken as it headed for the English Channel. Ocean Station ROMEO felt its sting on the 25th at 0300 when she reported 57-kn winds in 44-ft seas, near 47°N, 17°W. Some 600 mi to the southwest of the storm's center swells were running 15 to 20 ft. The HEINRICH HEINE(46.7°N, 9.2°W) encountered 60-kn westerlies in 19-ft swells at 1800 on the 25th. The storm weakened as it moved just north of the English Channel on the 26th. However conditions were still rough to the southwest. Near the Bay of Biscay the MYRMIDON was running in 39-ft swells late on the 25th and 36-ft swells early the next day.

It appears these ships had their weather damage during this storm. The EBN JUBAIR diverted to Brest on the 26th. The OCEAN WIND dragged anchor at Flushing Roads late on the 26th. The QUO VADIS had a huge swell on board on the 26th 10 mi southwest of Ike de Sein. The TFL JEFFERSON lost container overload enroute from Havre to Boston on the 25th.

A frontal were developed off coastal New England on Christmas Day to help bring a blanket of snow to some areas. Paralleling but eastward of a smaller LOW some 24 hrs earlier, this system moved in a broad counterclockwise loop across western Labrador and into Hudson Bay. The LOW deepened rapidly creating a steep gradient from south of the Labrador Sea through the Davis Strait. By 0000 on the 27th the 954-mb LOW was centered just west of Resolution Island in the Hudson Strait. An occluded front swung southeastward becoming a cold front south of about 50°N, near 50°W. Winds of 30 to 40 kn were common along the west coast of Greenland. The ERGINAI, east of the front, near 50.7°N, 47.5°W reported southeasterly 48-kn winds at 1800 on the 26th. Most of the shipping was south of the worst part of the storm. The LOW remained in Hudson Bay until the 30th. On the 28th pressure dropped to 950 mb.

The CIVADAD DEINCA, a 128 year-old sailing vessel sank at Kingston Ontario. She was considered the oldest commercial sailing vessel in the world.

Late in the month (29th) a LOW developed near 38°N, 64°W. It moved northeastward and on the

31st at 0000 its 980-mb center was located near 46°N, 45°W. Along the cold front to the south the REYNOLDS encountered 40-kn winds in 20-ft swells while 6 hrs before the ADA GORTHON near 46.5°N, 47.5°W reported 48-kn winds from the east southeast. On New Year's day the storm turned eastward and ships in its wake reported storm force winds. Ocean Station CHARLIE reported 50-kn winds in 25-ft seas (52.7°N 35.5°W) while the COLERAINE in 20-ft swells was encountering 40-kn winds about 300 mi to the southwest. The strongest winds were reported by the CAST HUSKY; these were westerly at 60 kn near 46°N, 34°W. Winds of 40 to 60 kn continued to be reported to the south and west as the 960-mb storm continued eastward. At 1200 on the 2d the STUTTGART EXPRESS ran into 50-ft swells in northwest 60-kn winds and 35-ft seas. By this time the central pressure had risen to 972 mb near 52°N, 5°W. The weakening system crossed into France on the 3rd.

On the 30th the BAND AID TRANSPORTER near 45°N, 15°W lost six containers and had a heavy list. The TEME had cargo shift on the 31st and diverted to Brest.

Casualties-- Four ships reported damage due to fog. The ANABELA struck a rock crossing Vila do Conde bar and capsized. The CIUDAD DE SANTA MARTA struck bottom in the Mississippi. The KOMSOMOLETS TADZHIKISTANA and BALDUIN collided in the Baltic Sea. The SUSANA and TAMA REX collided in the River Scheldt.

The BARONIA had ice damage at Dubuth on the 13th. Many tugs and barges were ice bound in the upper Mississippi River on the 13th.

These ships also had weather damage: DANAKOS, FOREST DUKE (Bay of Biscay), GEESTLAND, HUICHOL II (sank, only 38 of 71 crew rescued), OSCO CASTOR, POINTE LEVY, SARGODHA, STEFAN E., XI FESTIVAL (aground in Bosporus on 6th).

North Pacific Weather Log

October, November and December 1985

WEATHER LOG, OCTOBER 1985-- There were three weak primary storm tracks this month that closely matched climatology. One was from approximately Ostrov Simushir north-northeastward across the eastern tip of Siberia. Another was from near 33°N, 150°E northeastward to 40°N, 170°E. A third was from 45°N, 170°W into the Gulf of Alaska. A storm made an anticyclonic loop north of Kauai, Hawaii between the 17th and 20th.

The mean sea-level pressure pattern was near normal except for an anomalous LOW over the Sea of Okhotsk (fig. 28). The Aleutian Low was a normal 1001 mb south of Valdez, AK. The 1025 mb Pacific High was 6 mb above normal at 37°N, 147°W. This was about 400 mi northwest of its normal location. As usual the subtropical ridge stretched east-west across the North Pacific from California to Korea.

A slight ridge in the Pacific High at 160°W resulted in a plus 10 mb anomaly center near 49°N, 160°W. There also was a plus 7 mb center over eastern Siberia. The largest negative anomaly center was 6 mb over the Sea of Okhotsk. There was a minus 3 mb center near Skagway, AK. The majority of the ocean had above normal sea-level pressure.

The upper-air pattern at 700 mb was primarily zonal between latitudes 40°and 50°N. There was a long-wave trough southward across Japan and another south from the Kenai Peninsula of Alaska.

The were four tropical cyclones over the western ocean and two over the eastern ocean.

Some climatology. On October 21, 1934 a severe wind storm hit the northern Pacific coast. In Washington 22 persons were killed. The winds reached 87 mi/hr at North Head, WA. Waves were over 20-ft even on inland waters of Puget Sound and Lake Washington.

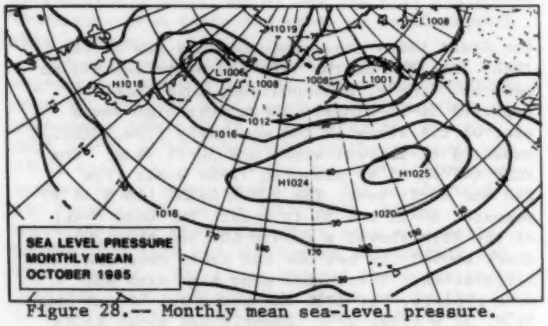

Figure 28.-- Monthly mean sea-level pressure.

Extratropical Weather-- October began with two large HIGH's across the midlatitudes, a LOW over the Sea of Okhotsk and two LOW's in the vicinity of Alaska. Typhoon Brenda was over the Philippine Sea. The Pacific High move northward and the midocean HIGH eastward. The Asian LOW tracked eastward and increased in size, at midweek it was at midocean south of the Bering Sea. Near the end of the week it weakened and a smaller more powerful LOW had moved eastward from northern Honshu. A blocking HIGH was off the North American Coast.

The severe LOW turned northward and was over Point George Island on the 8th. The Pacific High retreated south of latitude 40°N. At midweek the ocean was primarily dominated by high pressure which continued to the end of the week.

A LOW which earlier had skirted the Kurile Islands intensified over the Bering Sea on the 15th. High pressure still prevailed over the midlatitudes. Typhoon Dot was moving westward over the Philippine Sea. At midweek another LOW was over the Sea of Okhotsk and the earlier LOW reintensified over Alaska and moved south off

the British Columbia coast. The primary HIGH was over the central ocean the last of the week. As the fourth week began another HIGH moved out of Asia but the high pressure belt was weakening in general. A weak LOW that moved eastward across the northern latitudes intensified over Alaska. By midweek low-pressure cells predominated except for a large, weak Pacific High west of California. By midweek a strong north-south elongated HIGH was alined with 180°. At the end of the week there were two strong LOW's over the northern latitudes. At the end of the month two more strong LOW's were along 55°N. Hurricane Mele was near Maro Reef of the Hawaiian Islands.

The first severe storm of the month formed as a trough moved southward around the west side of a large, weak LOW over the central ocean. Observations at 0000 on the 5th from several ships help identify the formation of the LOW and front. The JAPAN BEAR and JINSEN MARU were two of the ships. Twelve hours later the JINSEN MARU was reporting 40-kn winds, 15-ft seas, and 30-ft swells. At 0000 on the 6th the WGKF at 36°N, 156°E reported 52-kn north winds, 16-ft seas, and 25-ft swells. The HOJIN MARU (32°N, 164°E) had 46-kn winds and 26-ft seas while the MAINE had 38 kn, 20-ft seas, and 23-ft swells.

At 0000 on the 7th the storm was 966 mb near 44°N, 177°E (fig. 29). Two ships reported winds of 60 and 62 kn. They were the NICHIRIN MARU (39°N, 177°E) with 26-ft swells and the SENYO GLORY (41°N, 175°E) with no waves reported The JFLX (38°N 179°E)had 50-kn winds, 20-ft seasm and 33-ft swells that continued until at least 1200. The PRESIDENT TYLER (43°N, 175°E) reported 35-ft seas and 36-ft swells. On the 8th they had decreased to 18-ft seas and 25-ft swells. The storm was at 55°N, 174°W at 972 mb. The winds were mostly gales. The SURUGA MARU (51°N, 163°W) had only 37-kn winds but the seas were 23 ft and the swells 33 ft on the 9th. Buoy 46003 had 23-ft waves. The storm died on the North Slope of Alaska on the 11th. Many vessels reported high winds and waves to WBH 29 on the 7th, 8th and 9th. Some of them were: the MARGARET FOSS, WOLDSTAD, OCEAN CHALLENGER, ALPHA HELIX, MARINE PIONEER, SANDRA FOSS, and HARRIS BAY.

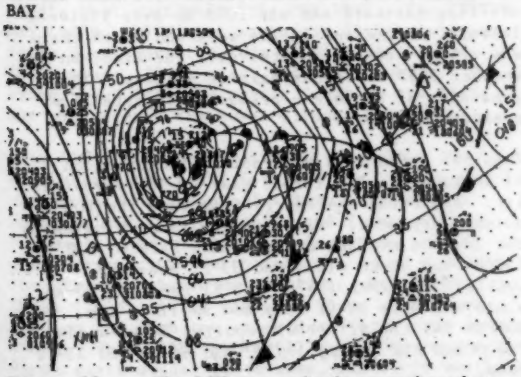

Figure 29. — The LOW was swinging northward on the 7th.

This frontal wave formed over the Yellow Sea late on the 11th. It raced northeastward as a frontal wave until the 14th. At 0000 on the 14th it was 984 mb near 57°N, 169°W. There were some gales in the southwest flow east of the front on the 13th. On the 14th the AVILA (45°N, 157°E) found 30-ft swells just east of the front. At 1200 buoy 46035 measured 23-ft waves. The GALE WIND (58°N, 163°W) had 40-kn winds and 20-ft swell. The TINY (60°N, 163°W) had 45 kn. On the 15th the MINESHIMA MARU (60°N, 175°W) had 45-kn west winds. The NMMJ had 36-kn south winds. The NDWA and NRUD both had 39-kn winds on the Bering Sea. There were some gales early on the 17th. The storm was gone by the 18th.

On the 16th a LOW formed at the point of occlusion of a front near Montague Island in the Gulf of Alaska. It remained quasistationary until the 19th. On the 17th the storm was 985 mb. The CHEVRON LOUISIANA (53°N, 143°W) had 35-kn winds with 8-ft seas, and 20-ft swells. The MOBIL MERIDIAN (59°N, 143°W) had 40-kn winds. At 1200 the ORIENTAL EXECUTIVE (54°N, 164°W) had 48-kn northwest winds. On the 18th the KASHIMA MARU (57°N, 164°W) found 45-kn winds and 20-ft swells. The SURUGA MARU (53°N, 148°W) reported 54-kn winds. At 1800 a ship at 56°N, 155°W sent a storm report of 57-kn winds. The waves were picking up on the 19th. The SURUGA MARU now had 50-kn winds, 23-ft seas, and 30-ft swells. Another storm report at 54°N, 153°W indicated 43-kn winds and 25-ft seas and swells. The storm was now moving southeastward. On the 20th the ASPEN at 46°N, 131°W had 40-kn west winds and 23-ft swells. The storm moved ashore near Vancouver Island on the 21st.

As the prior LOW moved ashore another formed over the Gulf of Alaska. At 0000 on the 22nd the LOW was 972 mb west of Sitka, AK. The KASUGAI MARU (54°N, 154°W) had 39-kn winds, 25ft seas, and 23-ft swells. Two other ships were reporting 40-kn winds and 20-ft swells in the area. Buoy 46004 reported 21-ft waves on the 22d and 23d. The CANADIAN ACE (54°N, 150°W) reported 49-kn winds, 30-ft seas, and 28-ft swells, which continued into the 23d only slightly diminished. The PRESIDENT GRANT (53°N, 145°W) had 40 kn and 20-ft swells. The storm had remained nearly stationary. On the 24th the DZFE (51°N, 143°W) reported 55-kn winds but no waves. The GRANT now had 45-kn winds and 20-ft swells.

The storm was now weakening but on the 26th was rejuvenated by a LOW that move ashore to the south. The LUCID STAR (50°N, 148°W) had 45°kn winds. The storm weakened again late on the 27th and no longer existed on the 28th.

This storm came out of Manchuria and moved over the La Perouse Strait on the 26th. Once over water it intensified and was 981 mb at 0000 on the 28th near 51°N, 162°E. A ship near 47°N, 171°E had 40-kn winds and 25-ft swells on the 27th. The PRESIDENT GRANT was near 53°N, 170°E with 35-kn winds, 16-ft seas, and 30-ft swells.

On the 29th another LOW was moving northward east of this storm resulting in a large cyclonic

circulation. Most of the stronger winds were gale force. The MATEMATIK and KLYUCHEVSKOY were both near 50°N, 155°E. with 43-kn winds and 23-ft seas. The BALDER ANTWERPEN (50°N, 159°E) had 48-kn winds, 20-ft seas, and 33-ft swells. At 0000 on the 30th the storm was 989 mb at 53°N, 176°E. The DZFE (52°N, 176°E) reported 55-kn west winds, and 989 mb nearly in the center of the storm. A ship in the southwest quadrant had 20-ft seas and 23-ft swells. On the 31st the storm was weakening with maximum winds of only gale force.

Casualties-- The ARCTIC IVIK had propeller damage from ice in the Beaufort Sea the first week of October. The CAROLYN JEAN stranded in heavy weather at Portage Bay, AK. Cargo shifted in high seas on the HOELIEN north of Sydney. The crew of 25 abandoned ship and were rescued. The vessel sank.

WEATHER LOG, NOVEMBER 1985-- There was a concentration of significant extratropical cyclones over the northwestern part of the ocean. The cyclones over the northeastern ocean scattered from latitude 30°N to Alaska. High pressure over the North American coast until the latter part of the month deflected most cyclones. There was a primary track from central Honshu to central Bering Sea and another from Sakhalin Island to the western Bering Sea. There was a vast difference in the monthly mean sea-level pressure chart and the climatic chart (fig. 30) climatology indicates a 1000 mb Aleutian Low over the Gulf of Alaska. This month the Low was 999 mb east of Kamchatka. A 1028 mb High was over the Yukon verses a 1019 mb High near the Great Salt Lake. The Pacific High was normal 1020 mb with two centers and broken from the western cell by a 1012 mb Low north of Hawaii. A ridge of the 1035 mb Asian High stretched to a 1019 mb center near 30°N, 170°E. There were four significant sea-level pressure departure center (fig. 31). The most important was a plus 16 mb near 57°N, 148°W. This positive area was north of 40°N and east of 180°W. There was minus 6 mb center over Colorado, a minus 8 mb center over the northern Sea of Okhotsk, and a minus 7 mb near 30°N, 155°W.

The primary difference between the upper-air chart at 700 mb and climatology was the normal ridge over the North American west coast was retrograded to approximately longitude 145°W. There was the usual trough along the Asian east coast, a trough just west of the ridge and another over the Rocky Mountains.

Extratropical Weather-- November began with multiple pressure centers affecting this ocean. At midweek there was a deep LOW over the Bering Sea. High pressure began building eastward toward California and the LOW was dissipating. At the end of the week and beginning of the second week there was a HIGH east of Hokkaaido and another south of the Gulf of Alaska. A LOW developed between the two HIGHs. It deepened and was over the Bering Sea at midweek and then

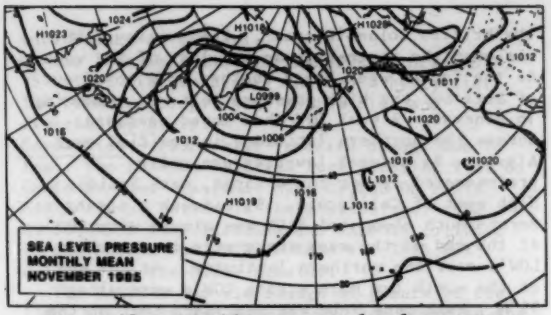

Figure 30.-- Monthly mean sea-level pressure.

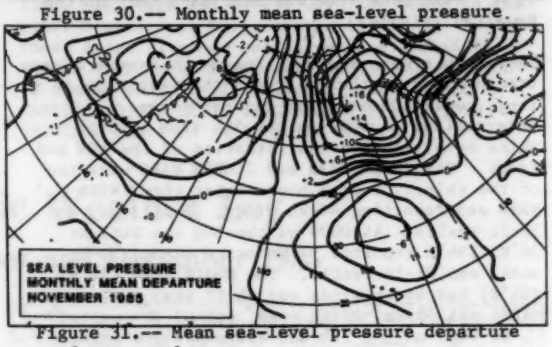

Figure 31.-- Mean sea-level pressure departure from normal.

moved into the Beaufort Sea. A HIGH over the Yukon had built to 1052 mb. By the end of the week the extreme HIGH had weakened and the ocean was again cutup into multiple centers.

The third week a HIGH cell that had moved northward from the central subtropics began tracking wastward. There was a significant cutoff LOW north of Hawaii. The HIGH moved over Alaska and British Columbia. The cutoff LOW turned north then northwestward. Near the end of the week another LOW formed north of Hawaii. The HIGH had consolidated over the Yukon, again at 1052 mb. There was a tight northeast-southwest gradient from eastern Siberia to about 40°N, 140°W.

The fourth week two cyclones penetrated the southern part of this high pressure and tracked eastward to the U.S. West Coast. The HIGH was drifting eastward and was 1063 mb over Victoria Island. At the end of the week and month there was a high pressure center over the midocean and another 1057 mb center east of Skagway. The remainder of the ocean primarily suported low pressure centers.

Tropical storm Faye was rapidly fading south of Tokyo and a LOW formed east of Tokyo on the 1st. Absorbing the energy from Faye the LOW quickly expanded. Gales were already blowing on the 2d. On the 3rd the SEA-LANE PATRIOT (38°N, 156°E) had 52-kn winds and 33-ft seas and swells. The WPHZ (39°N, 160°E) reported 40-kn winds and only 16-ft seas and swells. The HOOPER BAY (57°N, 171°W) reported 50-kn winds. The OCEAN FIN (55°N, 170°W) had 60-kn and 35-ft seas.

At 0000 on the 4th the storm was 954 mb near

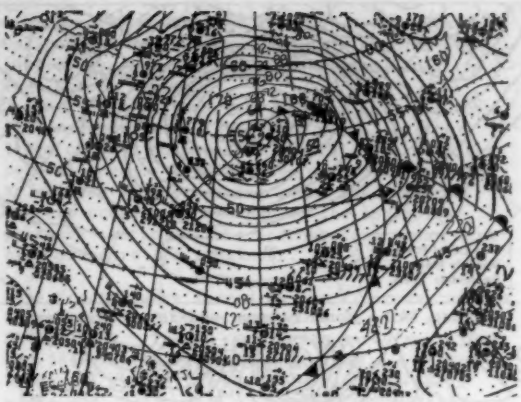

Figure 32.— The 954 mb storm with near hurricane force winds and 35 ft waves.

55°N, 175°E (fig. 32). The EASTERN FRIENDSHIP (51°N, 173°E) measured 54-kn west winds, 33-ft seas, and 35-ft swells. At 0000 on the 5th the storm was 970 mb at 57°N, 178°W. There were several storm wind reports. The EASTERN FRIENDSHIP (51°N, 172°E) measured 53-kn winds, and 33-ft seas and swells. The KITAURA MARU (52°N, 170°E) measured 51-kn winds 20-ft seas, and 30-ft swells. The winds were below gale force on the 6th.

The storm moved across the northern Gulf of Alaska on the 6th and 7th and turned southward down the California coast on the 10th and died out over central California on the 11th. There were a few wave reports above 20 ft during this time.

This cut-off LOW formed north of Midway Island on the 6th. As it tracked northward on the 7th and 8th there were a few gale reports. On the 1200 chart of the 8th this LOW was dissipating and another 974 mb LOW had explosively developed about 500 mi to the north over Adak Island. The EXPRESS (55°N,163°W) reported 70-kn winds gusting to 100 kn. The POLAR MERCHANT and MARCY both reported 60-kn winds. At 0000 on the 9th it was 960 mb. The PRESIDENT HOOVER (54°N, 178°E) measured 50-kn winds, 23-ft seas, and 30-ft swells that continued into the 10th. The NORTON BAY (60°N, 169°W) had southeast 55-kn winds and 25-to 30-ft waves. A ship at 54°N, 177°E had 50-kn winds, 23-ft seas, and 30-ft swells. The storm moved into the Arctic Ocean on the 11th and then across the Queen Elizabeth Islands.

This LOW formed in the trough of another LOW that blazed the trail for this one. It formed on the 18th northeast of Midway Island. The observations from two ships and Midway enabled the analyst to identify its formation. High pressure over the North American coast directed the storm northward on the 19th. The OCEAN VENUS (28°N, 163°W) reported 50-kn winds. At 0000 on the 20th the storm was 984 mb near 38°N, 160°W. The GLOBE TRADER (37°N, 163°W) reported 53-kn north winds, 20-ft seas, and 33-ft swells. The CURRENT (30°N, 158°W) had only 40-kn winds but reported 33-ft seas. The KAMNIK (35°N, 162°W) had 45-kn wind and 28-ft seas. The storm was very weak on the 21st as it moved northwestward against a very tight gradient between it and a 1055 mb HIGH over the Yukon. Buoy 46003 reported 23-ft waves. The PRESIDENT GRANT (50°N, 147°W) was also in the tight gradient with 43-kn southeast winds, 20-ft seas and 23-ft swells. The storm was gone early on the 22d.

A frontal wave was found south of Honshu on the 0000 chart of the 24th. Cold air from the Asian High was separated from warm tropical air by a storing cold front. The storm quickly intensified and by the 25th several ships had storm force winds. The TITAN (36°N, 162°E) had 51-kn winds, 31-ft seas, and 33-ft swells. The MUTSU MARU nearby also reported 51-kn but only 16-ft waves. The storm was racing northeastward at 50-kn. At 0000 on the 26th it was 968 mb near 54°N, 178°E. The CHASTINE MAERSK (54°N, 174°W) had 60-kn winds, 12-ft seas, and 30-ft swells. The HO-YU (54°N, 168°W) measured 60-kn winds with only 200 yd visibility in heavy rain with 35-ft seas and swells. On the 27th the 8JAU (54°N, 166°W) measured 55-kn west winds, 26-ft seas, and 30-ft swells. The PORTLAND (58°N, 149°W) measured 53-kn southeast winds. The storm was pushing against a 1058 mb HIGH over the Arctic Ocean and loosing. The ALEUTIAN HARVESTER sank in "150-kn" winds south of Unimak Pass on the 27th. Only an empty liferaft was found.

This storm formed over the Sea of Japan on the 27th, again as the reaction of cold Asian air meeting warm tropic air. This storm also deepened rapidly but moved northeastward as less than 30 kn. At 0000 on the 29th the storm was 980 mb. The UNI-MASTER (48°N, 156°E) measured 46-kn south winds, and 30-ft swells. There were many gale reports. At 0000 on the 30th storm was 968 mb near 55°N, 164°E. The AMERICA MARU (50°N, 167°E) reported 64-kn winds from 240°, 16-ft seas, and 30-ft swells. The JAPAN ALLIANCE (49°N, 166°E) measured 49-kn winds, 7-ft seas, and 33-ft swells. On December 1 the QUEENS WAY BRIDGE (53°N, 176°E) found 54-kn winds, 16-ft seas, and 26-ft swells. The HO-YU (54°N, 172°E) had 50-kn winds, 13-ft seas, and 30-ft swells. The PRESIDENT GRANT (54°N, 178°W) was sailing into 33-ft swells. On the 2nd her winds were 50-kn, seas 30-ft and swells 46 ft. The storm was now weakening.

This was a short-lived severe storm. It began over the central ocean on the 28th. At 0000 on the 29th it was 968 mb. The SEALIFT PACIFIC (49°N, 172°W) had 45-kn winds, 15-ft seas, and 30-ft swells. On the 30th her winds, were 48 kn still with 13-ft seas and 39-ft swells but the direction had switched 30° to 310° the same as the wind. By 1200 on the 30th the storm could no longer be analyzed.

A LOW moved southward toward Hawaii on the 27th and on the 28th and the 29th was near the Big Island. By the 30th it was moving back northward and another center formed that became this storm. By 0000 on December 1 the pressure had plunged to 964 mb. The BOGASARI EMPAT

(44°N, 141°W) measured 55-kn east winds, 36-ft seas, and 33-ft swells. The PRESIDENT WASHINGTON (39°N, 137°W) measured 60-kn southeast winds, 26-ft seas, and 36-ft swells. At 1200 she was almost directly in the center of the storm . On the 2nd the seas were 30-ft and the swells 43 ft. The storm was 956 mb near 39°N, 136°W (fig.33). There were waves higher than 20 ft reported in all quadrants. The storm turned northward as it moved against high pressure over the U.S. Coast. On the 3d the winds decreased and there were only a few 20-ft waves still reported. The storm no longer existed by the 4th.

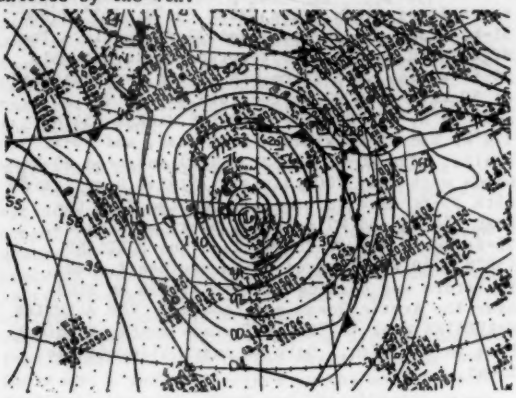

Figure 33.-- The PRESIDENT WASHINGTON was about 90 mi southeast of the storm at this time.

Casualties-- Although there were many severe storms there were few casualties. The KALVIK suffered ice damage in the Beaufort Sea. The SHELDON LYKES had weather damage on the 7th. The TAKAMI MARU No.8 and SHIN SAKURA MARU collided in dense fog on the 8th at the entrance to Tokyo Bay. The GIORGIS listed in heavy weather from the 9th to 10th. The JUNG KEUM No.7 sank off southwestern Japan on the 17th in rough water. Six crewman were dead and four missing. The OFELIA listed in heavy weather off the Philippines after the cargo shifted. The NELLA DAN was trapped in ice in Amundsen Bay 12 mi off the Antarctic coast with 67 people on board beginning October 28. The icebreaker/supply ship ICEBERG was diverted to help and pick up 14 stranded scientists from Heard Island. As of December 2 the NELLA DAN was still trapped.

WEATHER LOG, DECEMBER 1985-- The storm tracks were widely dispersed from approximately 30°N to 60°N from Asia to North America. There were more than the usual storms off the U.S. West Coast. Since the storms were dispersed the primary tracks were not obvious. The Aleutian Low was one deep 984 mb center near 54°N, 180° (fig. 34). Climatology indicates two 1000 mb Lows, one in the Gulf of Alaska and the other north of the Rat Islands. There was a small Pacific High at 1022 mb off San Francisco. A 1030 mb High was centered over Idaho. Another 1036 mb High was centered near 82°N, 150°E. The largest anomaly center was minus 20 mb near 57°N, 180°. It dominated most of the northern

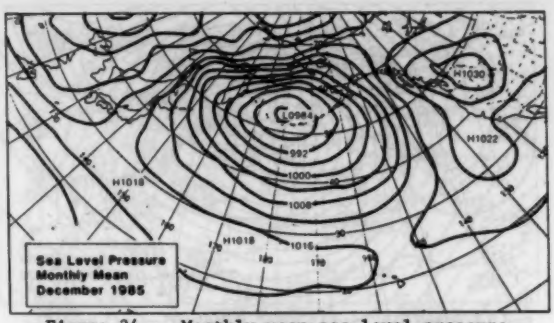

Figure 34.-- Monthly mean sea-level pressure.

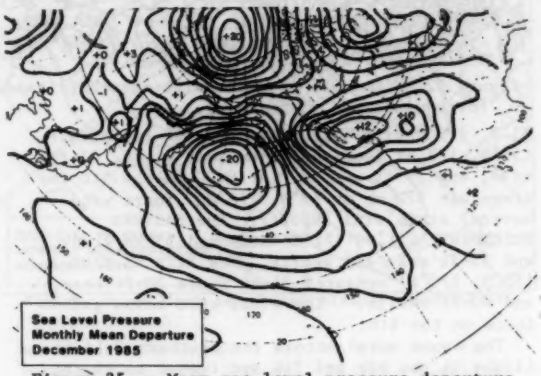

Figure 35.-- Mean sea-level pressure departure from normal.

ocean and those shipping lanes (fig. 35). The High over Idaho produced a plus 12 mb center over the Canadian Rocky Mountains. The High near the North Pole resulted in a plus 20 mb anomaly.

The upper air flow at 700 mb was zonal between 30°N and 50°N from Japan to 170°W where the flow turned northeastward and northward to form a sharps ridge over the North American coast and into Alaska.

Extratropical Weather-- The month began with a severe storm off the California coast. There was a larger but not as severe storm over the Bering Sea. There were three HIGHs over the subtropics. On the 3d another severe storm formed over the midocean and tracked into the Gulf of Alaska. The LOW over the Bering Sea had multiple centers and was moving eastward. Another LOW moved out of Manchuria and was a powerful storm at the end of the week. The second week this new storm dominated the northern ocean and its influence was as far south as Hawaii. By midweek it had deteriorated and another storm was moving northeastward along the Kurile Islands. The Arctic High was 1052 mb. At the end of the week there was high pressure over the U.S. Great Basin. A small intense storm formed over midocean.

The third week started with multiple weak centers covering the ocean. These continued until midweek when a large cyclone incorporated five centers. There was cyclonic circulation from 25°N to 65°N and Japan to 135°W. One of the LOWs began to dominate and by the end of the

week was 956 mb at 45°N, 165°W. By the 21st the cyclone was again weakening. A HIGH of over 1040 mb near the Great Salt Lake dominated the West Coast.

This HIGH drifted westward and diverted the cyclones northward the fourth week. Another large cyclone encompassed several LOWs over the central ocean. Typhoon Hope was west of Japan. At midweek another strong storm was over the western ocean. At the end of the month low pressure controlled the northwestern ocean with high pressure the remainder.

This frontal wave formed on the first day of December. By 0000 on the 3d it was 976 mb at 43°N, 155°W. The CO-OP EXPRESS 1 (49°N, 163°W) had 58-kn winds from the northwest and 16-ft waves. A ship at 39°N, 166°W reported 62-kn winds and 16-ft waves. The ARCO PRUDHOE BAY (42°N, 150°W) measured 50-kn winds and 30-ft swells at 1800. At 0600 on the 4th the DIAHO MARU (47°N, 136°W) reported 59-kn southeast winds. The storm weakened on the 5th as it swung northwestward.

This storm came out of Manchuria on the 3d. At 0000 on the 6th it was 972 mb east of Cape Lopatka. The NANSHO MARU (46°N, 156°E) measured 45-kn west winds and 30-ft swells. There were storm-force winds on the 7th and high waves. The SEA-LAND ENDURANCE (37°N, 179°W) measured 50 kn and 30-ft swells. The CHARLES LYKES at 0600 and 1200 (41°N, 174°E) reported 45-kn winds and 59-ft swells. At 1800 the swells were down to 41 ft. The winds were still storm force on the 8th. The CHARLES LYKES again reported 59-ft swells. The SEA-LAND ENDURANCE found 39-ft seas.

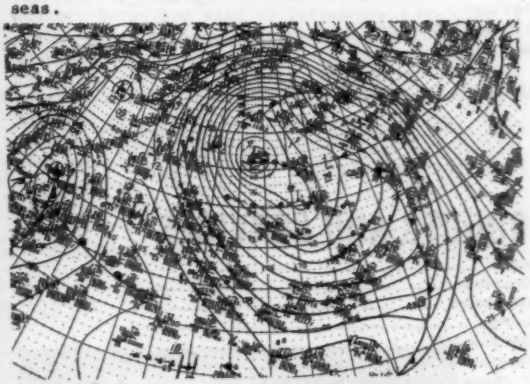

Figure 36.-- An overview of the North Pacific showing the large storm covering most of the ocean.

On the 9th the storm was 957 mb at 51°N, 177°W (fig. 36). The NOSAC EXPRESS (53°N, 168°E) measured 50-kn north winds and 33-ft swells. There were many winds of gale force and waves above 20 ft. The storm was weakening on the 10th and dissipated on the 11th over the Bering Sea.

This was a short-lived small severe storm that moved onto the Oregon Coast. It formed on the 6th and was 970 mb near 49°N, 145°W at 0000 on the 7th. The PERENNIAL ACE (47°N, 145°W) had 55-kn winds. The PRINCE OF TOKYO near 47°N, 145°W had had 63-to 45-kn winds and 36-to 43-ft swells on the 6th and 7th. The BAY BRIDGE (46°N, 136°W) measured 50-kn winds and 30-ft swells. On the 8th the storm dissipated as fast as it formed.

This frontal wave developed south of Tokyo on the 8th. It tracked northeastward along the Kurile Islands and was 966 mb on the 10th. Two fishing vessels near 46°N, 153°E had 53-kn winds and 33-ft seas. The TOKI ARROW (47°N, 157°E) had 60-kn southwest winds and 33-ft swells. On the 11th the OCTA (48°N, 164°E) had 30-ft waves. On the 12th her winds were 45-kn and waves 31 ft. She was a good reporter with 28-ft waves and 40-kn winds on the 13th. The storm was weakening on the 14th and turned westward to dissipate on the 17th.

This cyclone formed in an area of weak pressure gradient east of Honshu on the 16th. It was part of a large cyclonic circulation that covered most of the northern ocean. This LOW started to deepen on the 18th with gale-force winds. On the 19th the PROSPERIDAD (42°N, 175°E) had 52-kn winds and 23-ft seas. The WASHINGTON TRADER (35°N, 153°W) had 45-kn winds and 35-ft swells (fig.37). There were more high winds and waves on the 20th. The CHARLOTTE LYKES (36°N, 170°W) had 48-kn winds and 49-ft swells. The KMJS (35°N, 160°W) found 50-kn winds and 41-ft swells. The storm was breaking down on the 21st as it turned northward then westward.

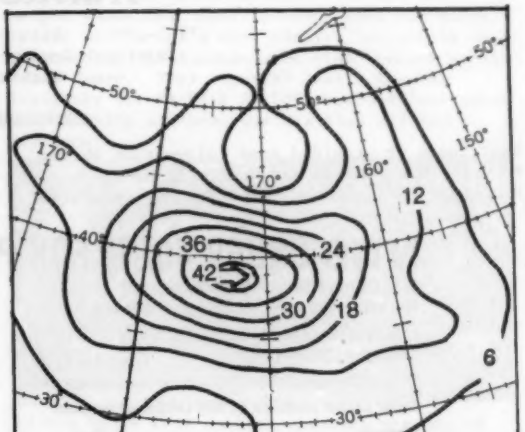

Figure 37.-- This chart indicates where the 40 ft plus wind waves are being generated.

The point of occulsion of a front east of Japan produced this LOW on the 23rd. There were already gales and 20-ft waves by 0000 on the 24th. The PRESIDENT JOHNSON (45°N, 150°E) found 55-kn winds, 33-ft seas and 62-ft swells according to her 0900 and 1200 report. AT 0000

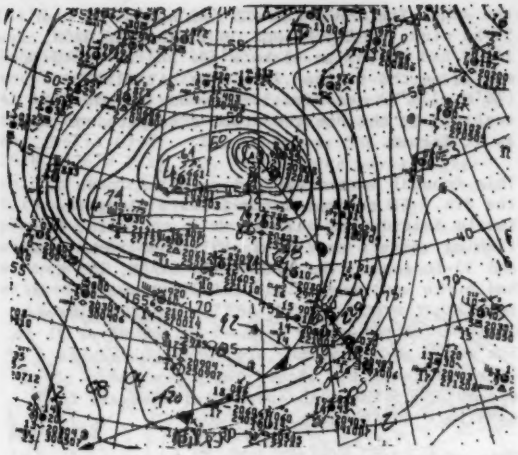

Figure 38.-- A large Christmas Day storm roams the central North Pacific.

on the 25th the storm was 950 mb near 47°N, 175°E (fig.38). The PACIFIC VENTURE (43°N, 177°W) measured 61-kn southeast winds and 39-ft seas. Three hours later the wind was 63 kn with 26-ft seas and 30-ft swells. The MENINA BARBARA (49°N, 173°E) measured 50-kn north winds, 39-ft seas and 36-ft swells.

There were no reports of the very high winds and waves on the 26th even though the storm appeared just as strong on the analysis. There were waves of 23 ft northwest of the center and up to 26 ft south of the 950 mb center. The storm was moving northward on the 27th and starting to weaken. On the 28th it curved southwestward. The SANKO RELIANCE (48°N, 157°E) measured 50-kn northwest winds and 33-ft seas and swells. The NELSON MARU (47°N, 159°E) also had 50-kn winds but only 20-ft waves. The LOW dissipated on the 30th.

Casualties-- The period around December 18 to 22 was difficult for ships in many areas of the Pacific. The ARCO ANCHORAGE grounded in fog at Port Angeles. The ASUNCION carrying up to 200 people sank in rough seas about 200 mi southwest of Manila. A total of 85 passenger and crew were rescued. The IRAN BESAT had heavy weather damage. The GLENDA capsized off Mindanao in rough seas. Seven of 27 aboard were rescued. The TORM VENTURE had weather damage. The DUBAI sustained damage on the 21st. The GUAICURI reported damage during the period Dec. 17 to Jan. 1.

The BETSIE F. grounded on Mindanao on the 24th in bad weather. The KUNIEI MARU No.18 capsized in rough seas in Tokyo Bay on the 28th. Four crewman were rescued, the engineer by frogman. The PAUL BUCK had damage on the 30th. Other Casualties-- The NELLA DAN trapped in ice off the Antarctic coast finally reached open water on the 16th with help from the icebreaker SHIRASE.

Hurricane Alley

Dick DeAngelis
National Oceangraphic Data Center
Washington, DC

HURRICANE HAVENS

Last issue we provided some information on how to order the Typhoon and Hurricane Havens Handbooks published by the Naval Environmental Prediction Research Facility. We did not include the order form (fig. 39). Below is a report of the pertinent infromation.

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TROPICAL CYCLONE SUMMARIES

The tropical cyclone tracks (fig. 40) and the summaries are based upon information provided by Ted Tsui of the Naval Environmental Prediction Research Facility. Clarence Lee and his staff at the Central Pacific Hurricane Center, Emil Gunther and his staff at the Eastern Pacific Hurricane Center and Neil Frank and his staff at the National Hurricane Center. Additional information was provided by the Joint Typhoon Warning Center at Guam. Details on eastern and central North Pacific storms may be found on pages 65 and 74 of this issue. Table 7 lists the tropical cyclones that have developed so far in 1986.

TROPICAL CYCLONES--OCTOBER 1985

During an average year about nine tropical cyclones develop and five of these reach hurricane intensity. This season eleven storms came to life in October and seven of these became hurricanes. Activity was confined to the last three weeks although a couple of western North Pacific typhoons from September were still active during the first week. Action extended from the western North Atlantic westward to the Bay of Bengal. Seven storms developed from the 7th through the 15th and the other four came to life between the 23d and 26th. Hurricane Juan caused problems to shipping and oil interests along the U.S. Gulf coast (fig. 41). Nine of the twelve reported death's were caused by toppled oil rigs or boats lost while transporting oil workers. Sinkings included the jack up vessel GULF ISLAND IV and lift barges INCA, ELO and AMY DINOS along the Louisiana coast. The pipe-laying barge CHEROKEE was impaled on another barge and sank in Terrebonne Bay. Two crewmen were missing from the MISS AGNES which sank off Morgan City. The jack up rig PENROD 61 collapsed and collided with the PENROD 60. Some 80 crewmen were rescued by a Chevron oil vessel. Typhoons Dot and Cecil devastated the coast of Vietnam. An estimated 900 people were killed or missing and inland 160 thousand acres of crops were ruined. Dot also caused 51 deaths and millions of dollars in damage in the Philippines. On the 15th in the Bay of Bengal a storm lashed the states of Orissa and West Bengal. Some 200 peolpe were missing, including 58 fishermen. Hardest hit was the village of Barakhanpur, which was completely washed away when the rain-swollen Subarnarekhae River broke its banks. Along the West Bengal coast a storm tide more than 6 ft high left some 50 thousand people homeless and devastated crops.

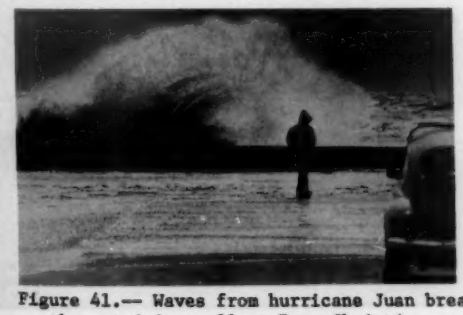


Figure 41.-- Waves from hurricane Juan breach the retaining wall at Pass Christian on the 29th. WORLD WIDE PHOTO.

TROPICAL CYCLONES--NOVEMBER 1985

Only three tropical cyclones, of which one was a hurricane, came to life this month. This compares with an average of six or seven tropical cyclones and three hurricanes. Inactivity was most apparent in the western North Pacific where only tropical storm Gordon developed. After an early start with a September tropical storm, the Southern Hemisphere remained quiet through October and November. The only hurricane occurred in the North Atlantic when Kate developed at mid month. On the 17th the BORIS BUVIN some 100 mi south of Kate's center encountered 70 kn winds at 1200. The other system was a tropical cyclone (05B) in the Bay of Bengal which came ashore on the 17th close to were last month's storm hit.
Kate hit northern Cuba and then the Florida Panhandle , causing flooding and forcing evacuation of coastal areas (fig. 42). Earlier as the storm moved through the southeastern Bahamas a 61-ft ketch the SUN QUEST reported she was sinking in 75-kn winds. The tank barge ST MAARTEN and tug STATIA ran aground on rocks adjacent to the jetty at St. Eustatius on the 16th. In Jamaica, Kate claimed seven lives and caused extensive crop damage. In other shipping incidents a Coast Guard cutter rescued two people whose boat sank in heavy seas off Marco Island on Florida's west coast. Two people on a sailboat in the Bahamas were also rescued by the Coast Guard. They reported that a Russian freighter the KAPITAN STULOV, rescued four other people where sailboat was disabled off Key Biscayne.

Figure 42.-- Kate left an unwanted present at Florida State University's Delta Tau Delta fraternity house. WORLD WIDE PHOTO.

TROPICAL CYCLONES-- DECEMBER 1985

Five tropical cyclones, only one of which reached hurricane strength, developed this month. These figures are close to the average of six tropical cyclones of which two become hurricanes. Two storms developed in the western North Pacific and two in the Southern Hemisphere; The other cyclone came to life in the Bay of Bengal. The Bay of Bengal storm became the fourth cyclone to hit the east coast of India during ties autumn season. Maximum

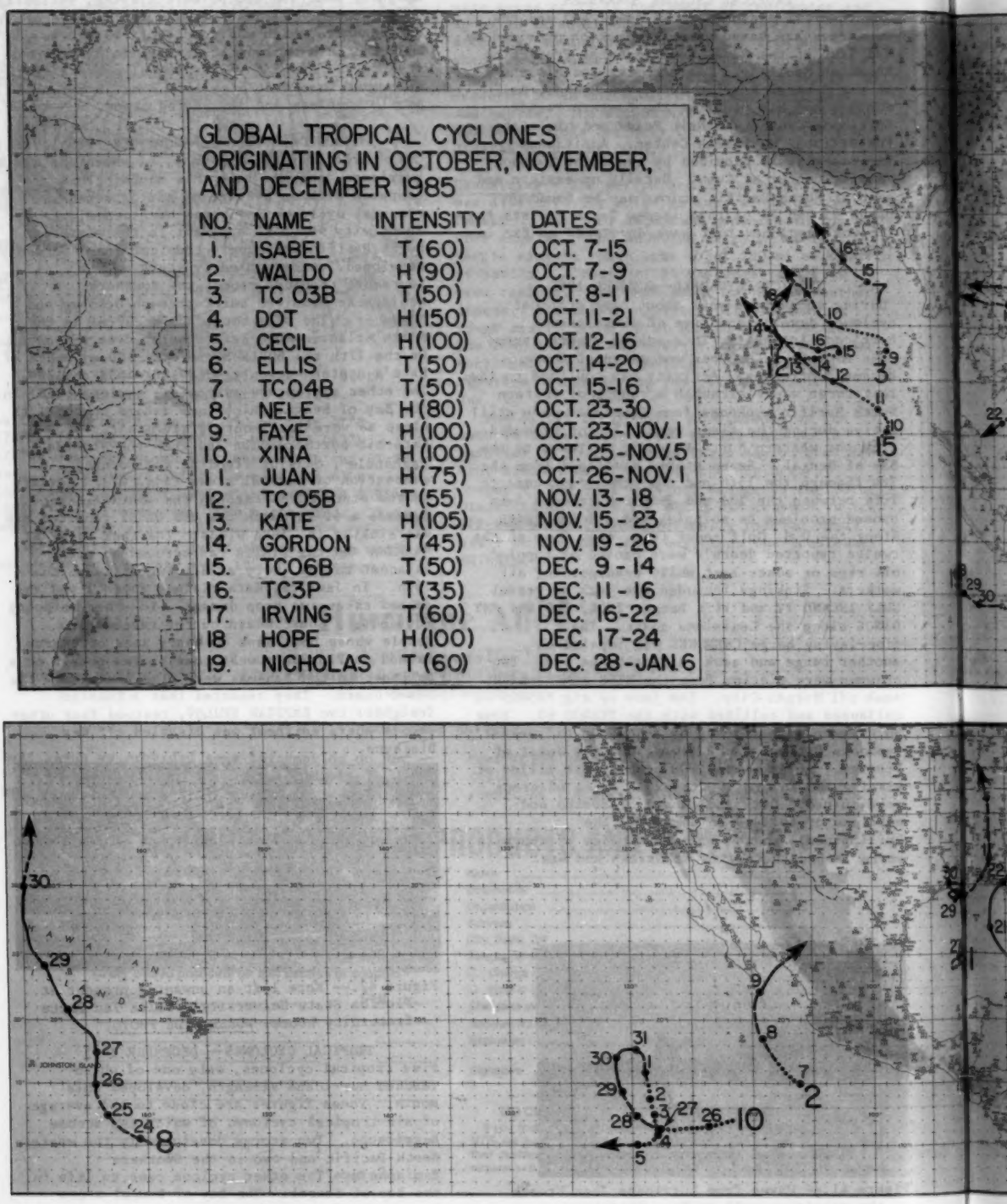
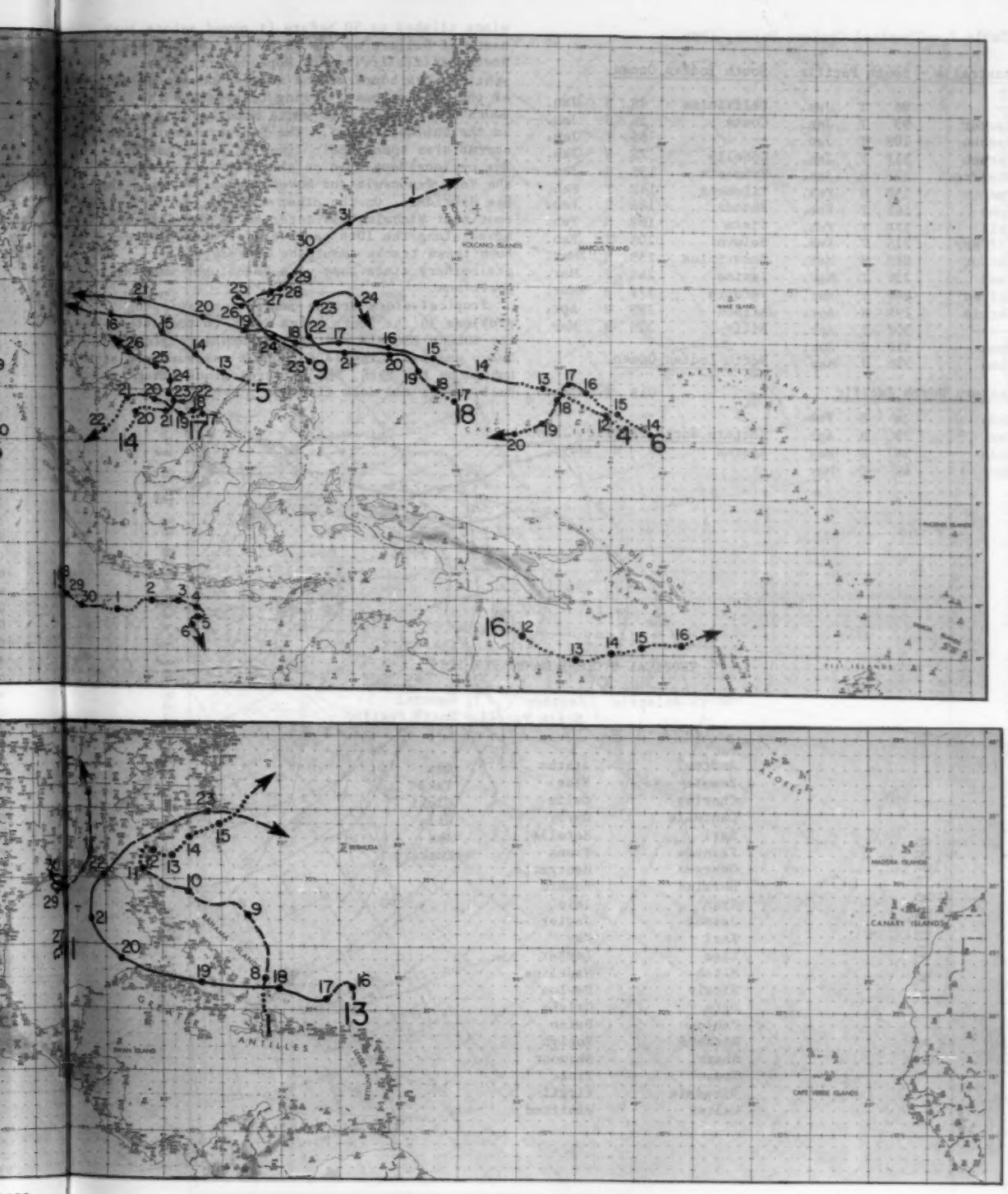


Figure 40.-- Tracks of tropical cyclones for October, November, and December 1985.


VOLCANO ISLANDS
MARCUS ISLAND
WAKE ISLAND
MARSHALL ISLANDS
CAROLINE ISLANDS
PHOENIX ISLANDS
SOLOMON ISLANDS
FIJI ISLANDS
BERMUDA
AZORES
MADEIRA ISLANDS
CANARY ISLANDS
CAPE VERDE ISLANDS
BAHAMA ISLANDS
GREATER ANTILLES
SWAN ISLAND

1985.

Table 7.--Tropical Cyclone Watch, 1986

Australia - South Pacific			
—	8S	T	Jan.
Hector	9S	T	Jan.
Pancho	10S	T	Jan.
Vernon	11P	T	Jan.
Winifred	12P	H	Jan.
Ima	15P	H	Feb.
June	16P	T	Feb.
Keli	17P	T	Feb.
Tiffany	21S	T	Feb.
Victor	22S	H	Mar.
Lusi	23P	T	Mar.
Alfred	24P	T	Mar.
Martin	29P	H	Apr.
-----	30P	T	Apr.
Manu	31P	H	Apr.
Namu	33P	H	May

Western North Pacific			
Judy	1W	H	Feb.
Ken	2W	H	Apr.
Lola	3W	H	May
Mac	4W	T	May

South Indian Ocean			
Delifinina	4S	H	Jan.
Costa	5S	H	Jan.
—	6S	T	Jan.
Ophelia	7S	H	Jan.
Erinesta	13S	H	Jan.
Filomena	14S	T	Feb.
Rhonda	18S	T	Feb.
Gista	19S	H	Feb.
Selwyn	20S	T	Feb.
Honorinina	25S	H	Mar.
Iarima	26S	T	Mar.
Jefotra	27S	H	Mar.
Alison	28S	H	Apr.
Billy	32S	H	May

North Indian Ocean			
—	01B	T	Jan.

Eastern North Pacific			
Agatha	1E	H	May

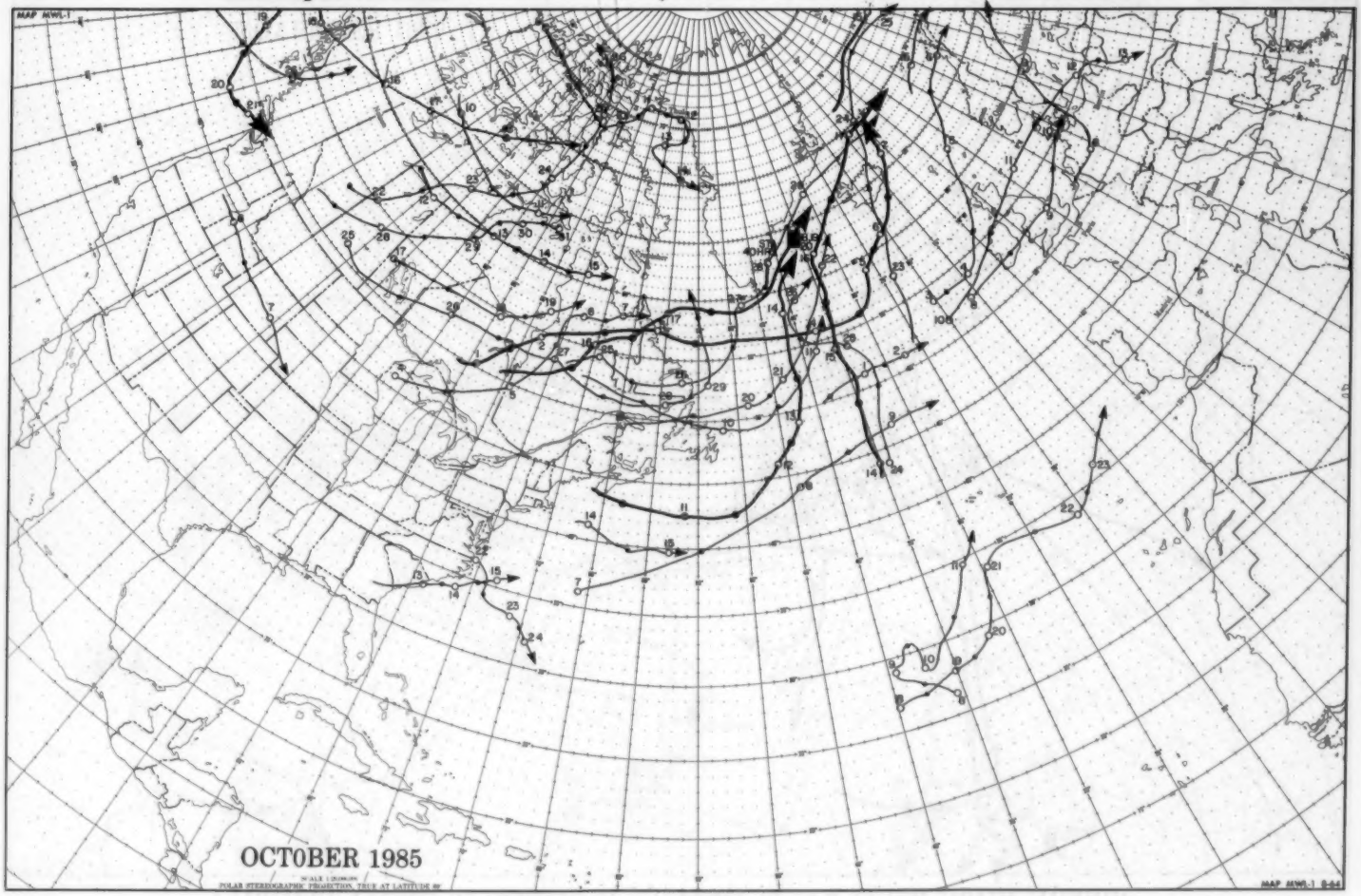
winds climbed to 50 before it moved ashore just north of Nellore on the 13th. In the western North Pacific Irving and Hope came to life wihtin a few hours of one another on either side of the Philippines. Irving transversed the South Sea for six days while Hope spent a week in the Philippine Sea. The Southern Hemisphere storms also spent their lives at sea. The Coral Sea cyclone developed on the 11th just east of the York Peninsula and moved eastward toward the New Hebrides. On the other side of the continent Nicholas was detected on the 27th and moved along the 10th parallel for nearly a week. Both these tracks should be considered preliminary since they were based upon warning positions.

Tropical storm Irving caused some shipping problems in the South China Sea. On the 16th the GOLDEN PHOENIX and JADE PHONENIX collided in heavy weather. The JADE PHOENIX was surveyed at Labuan on the 29th. She suffered minor damage to hull, holds and deck fittings.

TROPICAL CYCLONE NAMES FOR 1986

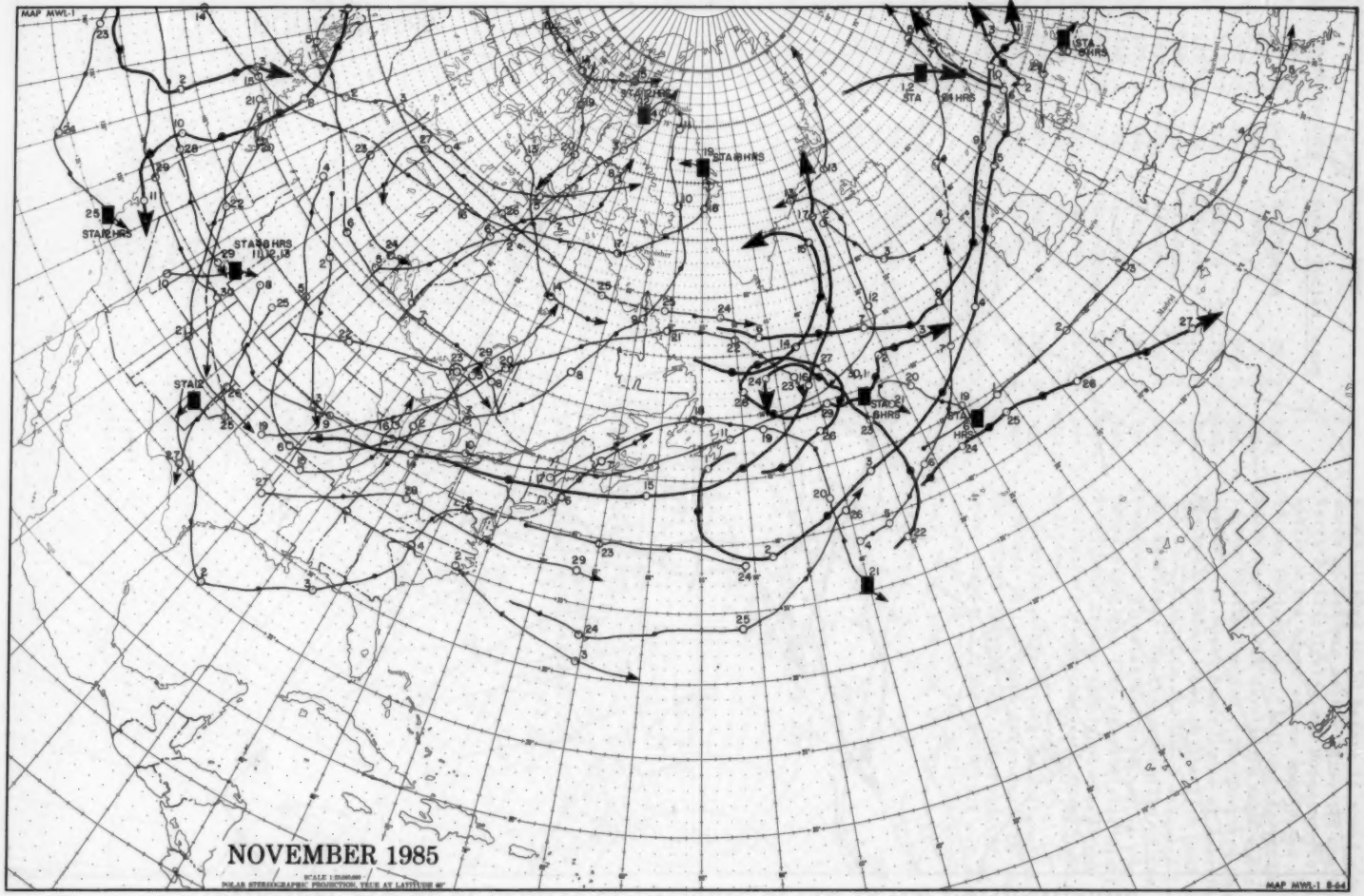
North Atlantic	Eastern North Pacific	Central North Pacific
Andrew	Agatha	Oka
Bonnie	Blas	Teke
Charley	Celia	Uleki
Danielle	Darby	Wila
Earl	Estelle	Aka
Frances	Frank	Ekeka
Georges	Georgette	
Hermine	Howard	
Ivan	Isis	
Jeanne	Javier	
Karl	Kay	
Lisa	Lester	
Mitch	Madeline	
Nicole	Newton	
Otto	Orlene	
Paula	Paine	
Richard	Roslyn	
Shary	Seymour	
Tomas	Tina	
Virginie	Virgil	
Walter	Winifred	

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

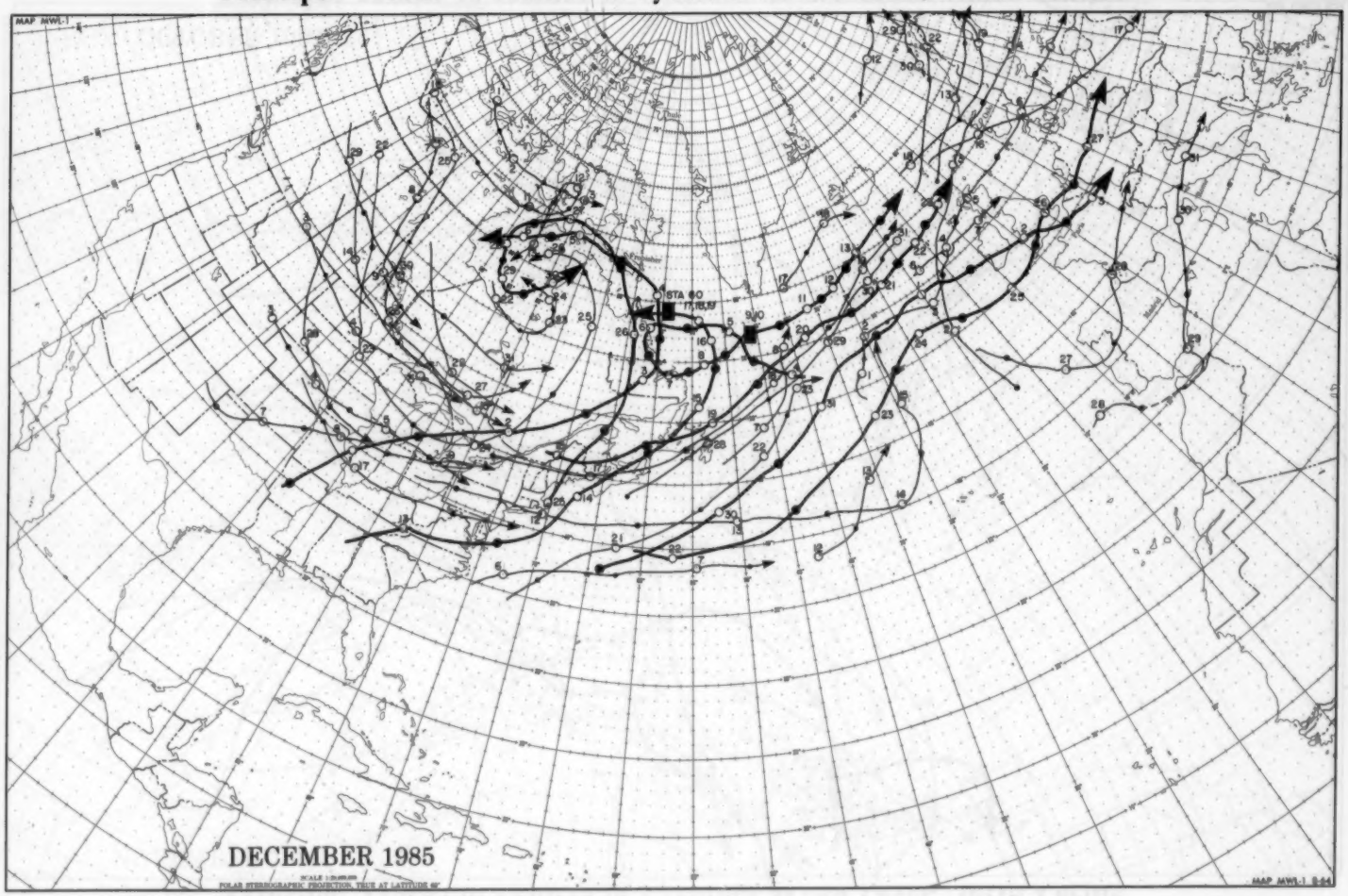
Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

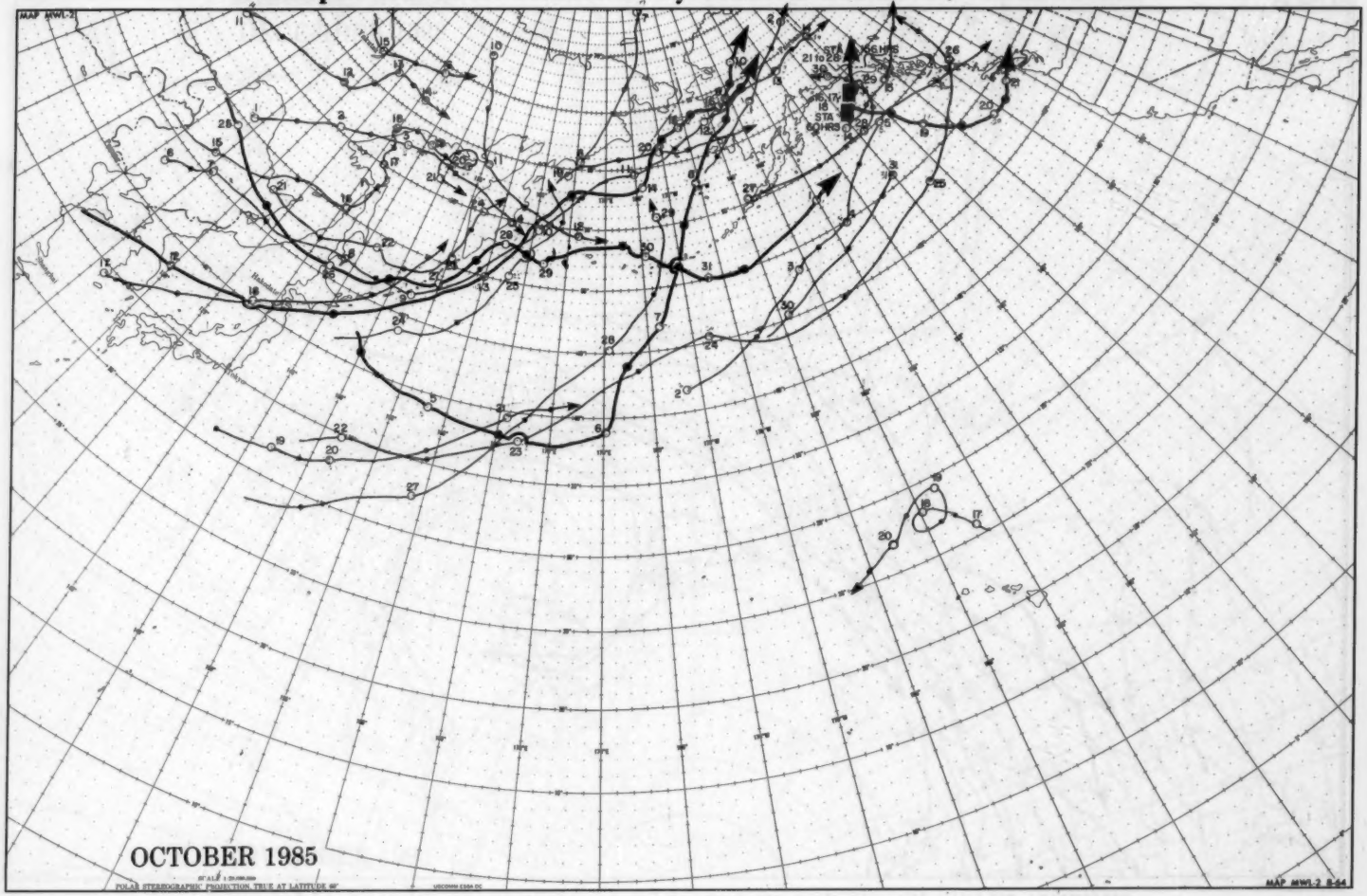
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Atlantic



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

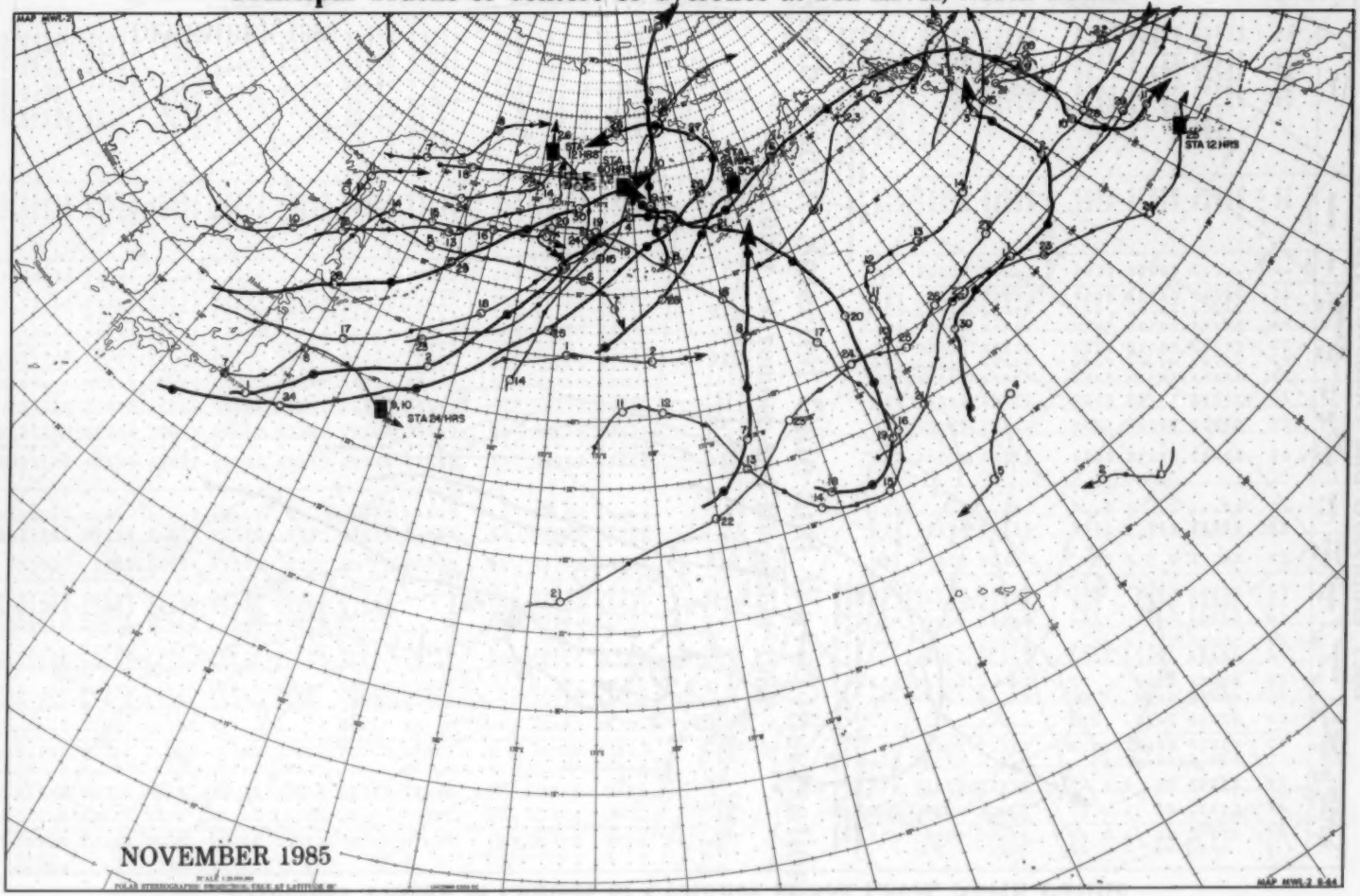
Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

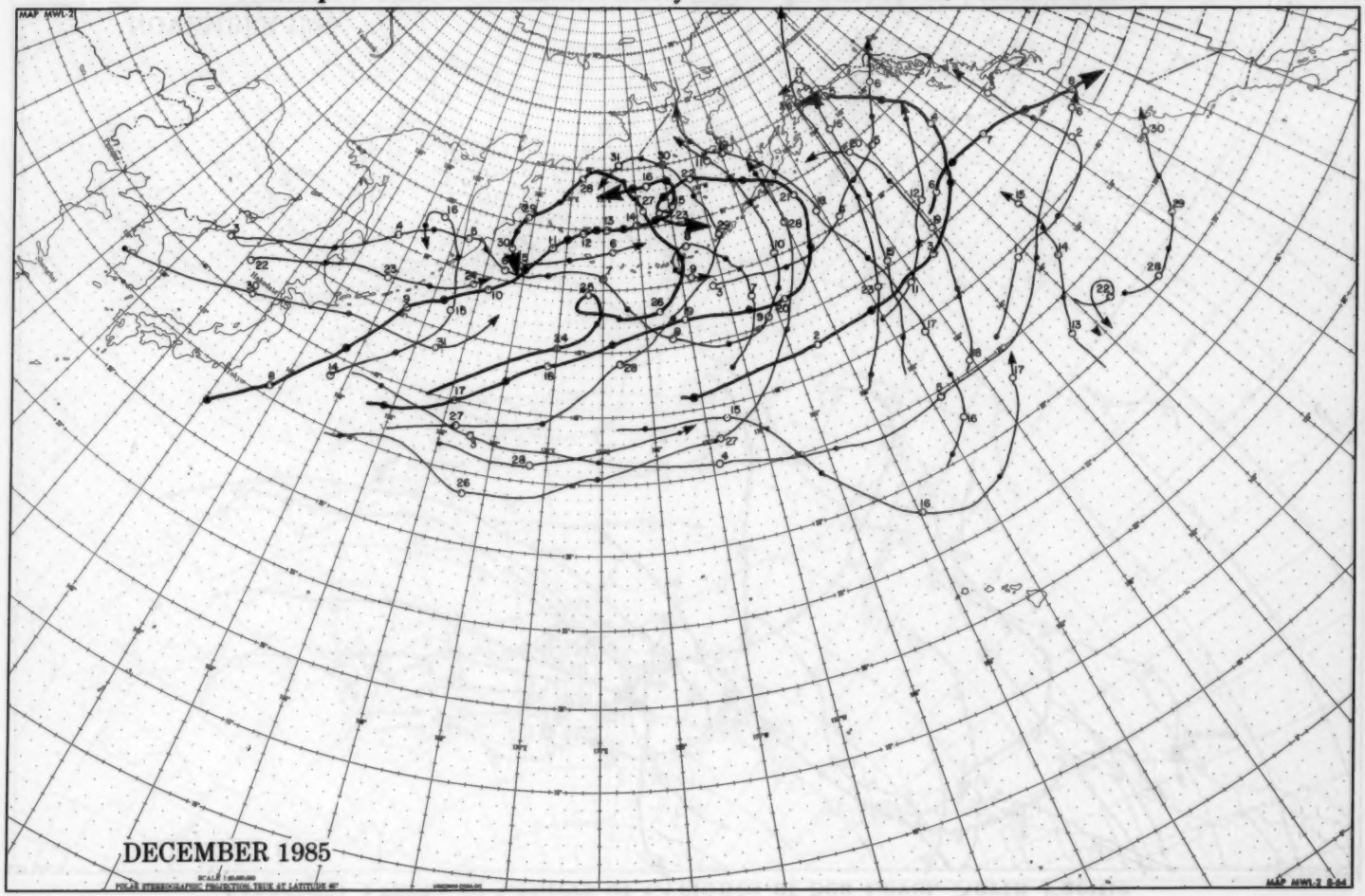
Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

Principal Tracks of Centers of Cyclones at Sea Level, North Pacific



Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

North Atlantic Selected Gale and Wave Observations

October, November and December 1985

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir.	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir.	Swell Waves Period sec.*	Swell Waves Height ft.
	ATLANTIC	OCT.															
TFL DEMOCRACY	9VPR	2	45.1 N	17.5 W	18	27	52	5 NM	83	0999.7	15.0	19.5	13	26	27	28	36
TFL DEMOCRACY	9VPR	3	44.3 N	21.7 W	12	29	50	10 NM	61	1006.0	16.0	19.5	10	26	29	24	32.5
	ATLANTIC	NOV.															
TFL DEMOCRACY	9VPR	8	44.6 N	29.4 W	12	32	50	10 NM	61	1010.0	11.0	16.5	12	16.5	31	30	49
TFL DEMOCRACY	9VPR	8	44.0 N	31.0 W	18	32	48	10 NM	25	1016.0	11.5	16.0	12	16.5	33	18	37.5
CONTINENTAL TRADER	6ZNK	9	45.6 N	19.0 W	00	25	50	5 NM	27	1000.5	11.0	17.0	12	19.5	24	18	29.5
CONTINENTAL TRADER	6ZNK	9	46.9 N	14.9 W	18	29	46	5 NM		1002.2	10.0	16.0	6	13	24	14	32.5
CONTINENTAL TRADER	6ZNK	10	47.3 N	13.6 W	00	26	49	5 NM	02	1000.5	11.0	16.0	10	19.5	24	14	32.5
CONTINENTAL TRADER	6ZNK	10	47.5 N	12.1 W	06	24	50	5 NM	02	1019.5	11.0	16.0	10	19.5	24	14	32.5
TFL INDEPENDENCE	9YPK	16	45.9 N	40.6 W	12	24	H 46	5 NM		0994.0	11.5	15.5	7	29.5	29	10	29.5
TONCI TOPIC	ELKX	16	41.7 N	55.9 W	12	32	55	2 NM	61	1020.0	6.0	15.0	10	29.5			
TONCI TOPIC	ELKX	16	41.5 N	54.3 W	18	32	50			1023.0	9.0	18.0	10	29.5			
DELAWARE TRADER	WKWL	20	24.7 N	84.0 W	05	08	80	< 50 YD	45		24.0		3	18	08	6	32.5
DELAWARE TRADER	WKWL	20	24.7 N	84.2 W	08	11	60	< 50 YD	82		24.0		2	19.5	07	6	29.5
SEALAND ADVENTURER	KSLJ	24	49.4 N	20.3 W	18	12	45	5 NM	02	1007.0	12.0		10	32.5			
TFL DEMOCRACY	9VPR	30	42.5 N	42.0 W	12	32	48	5 NM	27	0990.5	8.0	17.5	12	13	31	30	32.5
TFL DEMOCRACY	9VPR	30	42.7 N	40.0 W	18	30	45	10 NM		0984.5	10.0	17.0	10	13	31	22	32.5
	ATLANTIC	DEC.															
ALMERIA LYKES	WDDU	1	39.1 N	15.2 W	00	19	50	2 NM		0998.0	18.3	17.8	7	21	19	12	32.5
AMERICAN ENVOY	WPDH	1	38.4 N	43.8 W	12	33	45	10 NM	91	1003.0	11.7	18.9	6	14.5	33	14	29.5
SEALAND PACER	KSLB	3	38.3 N	61.7 W	18	26	45	5 NM		1001.0	14.5		3	11.5	27	5	36.5
SEALAND LEADER	WSNH	14	38.4 N	42.2 W	00	28	55	5 NM	02	0992.4	13.0		4	5	27	8	29.5
RAINBOW HOPE	KNDB	16	50.9 N	46.9 W	06	24	45	1 NM	53	0974.0	2.2	5.4	6	14.5	23	7	31
RAINBOW HOPE	KNDB	16	50.4 N	47.1 W	18	24	45	1 NM	53	0989.2	2.2	4.4	4	14.5	24	7	31
SEALAND VOYAGER	KHRK	21	48.0 N	28.0 W	00	27	H 47	5 NM	67	0994.5	5.0	12.0	6	10	27	13	31
SEALAND VOYAGER	KHRK	21	47.2 N	31.7 W	18	30	H 50	5 NM	67	1001.5	6.3	12.0	7	13	27	10	34.5
S.S. ROVER	KRBS	21	48.5 N	06.4 W	19	20	46	2 NM		1003.0	12.5	10.0	12	21	21	20	29.5
PENNSYLVANIA TRADER	WLDU	24	45.2 N	20.2 W	12	27	48	5 NM		1000.1	11.1	13.3	4	11.5	27	9	32.5
PENNSYLVANIA TRADER	WLDU	24	44.9 N	20.8 W	18	26	55	5 NM		0997.5	10.0	13.3	4	11.5	24	9	32.5
PENNSYLVANIA TRADER	WLDU	25	44.5 N	21.2 W	00	26	56	5 NM	60	1002.8	10.6	13.3	4	16.5	26	9	41
PENNSYLVANIA TRADER	WLDU	25	44.3 N	21.5 W	06	26	56	5 NM		1009.3	11.7	13.3	4	19.5	26	9	41

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
H Hoscored wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

North Pacific Selected Gale and Wave Observations

October, November and December 1985

Vessel	Nationality	Date	Position of Ship Lat. deg.	Position of Ship Long. deg.	Time GMT	Wind Dir.	Wind Speed kt.	Visibility n. mi.	Present Weather code	Pressure mb	Temperature °C Air	Temperature °C Sea	Sea Waves* Period sec.	Sea Waves* Height ft.	Swell Waves Dir.	Swell Waves Period sec.*	Swell Waves Height ft.
NONE	PACIFIC	OCT.															
	PACIFIC	NOV.															
EASTERN FRIENDSHIP	HBLR	3	53.1 N	176.1 E	12	16	H 50	.5 NM	81	0979.5	6.0	6.0	9	32.5	16	9	32.5
EASTERN FRIENDSHIP	HBLR	4	51.8 N	173.9 E	06	26	H 47	2 NM	60	0976.5	5.0	4.0	7	19.5	26	7	31
EASTERN FRIENDSHIP	HBLR	4	51.6 N	173.5 E	12	27	H 52	2 NM	60	0981.0	4.5	7.0	9	32.5	27	10	31
EASTERN FRIENDSHIP	HBLR	4	51.5 N	173.2 E	18	27	H 54	2 NM	60	0987.5	4.5	6.0	9	32.5	27	9	34.5
XLNT	3EPF3	4	52.8 N	172.1 E	23	30	H 50	2 NM		0994.0	5.0	7.0	12	31			
EASTERN FRIENDSHIP	HBLR	5	51.2 N	172.4 E	00	28	H 53	2 NM	05	0997.0	5.0	7.0	9	32.5	28	9	32.5
PRESIDENT HOOVER	KGBA	9	55.2 N	139.2 W	12	01	50	10 NM	01	1031.0	0.4	1.7	8	19.5	36	12	29.5
PRESIDENT HOOVER	WTST	9	53.6 N	177.8 E	21	32	H 50			0993.6	3.3	6.7	8	23	30	14	29.5
PRESIDENT HOOVER	WTST	10	53.6 N	177.4 E	00	30	H 50	2 NM	26	0997.5	3.8	6.7	8	23	30	14	29.5
CHASTINE MAERSK	GWCY	26	54.0 N	174.0 W	12	26	60	50 YD	07	0975.0	5.2		6	11.5	27	14	29.5
FLORIDA RAINBOW	3ETV3	28	52.8 N	158.7 W	05	31	H 47			1006.0	6.0	6.0	6	32.5	31	8	32.5
UNI-MASTER	H3YS	29	47.7 N	155.8 E	00	28	H 46	1 NM	63	0987.0	7.0	8.0			21	XX	29.5
USNS SEALIFT PACIFIC	NENC	29	48.7 N	171.6 W	06	29	45	2 NM	90	1010.5	5.4		6	14.5	29	16	29.5
	PACIFIC	DEC.															
BOGASARI EMPAT	YCSS	1	43.8 N	141.9 W	00	10	H 45	.25 NM	63	0990.0	11.5	14.0	11	32.5	08	12	31
PRESIDENT WASHINGTON	WHRN	1	38.8 N	137.5 W	18	14	H 60	10 NM	02		13.9	16.7	7	26	18	11	36
PRESIDENT WASHINGTON	WHRN	1	38.6 N	135.9 W	21	14	H 60	10 NM	02		15.0	16.7	8	26	18	11	36
PRESIDENT WASHINGTON	WHRN	2	38.3 N	134.6 W	02	18	H 60	5 NM	61		15.0	16.7	10	29.5	22	14	39
PRESIDENT WASHINGTON	WHRN	2	37.7 N	133.8 W	03	27	H 58	5 NM	02		14.4	17.2	10	29.5	24	14	32.5
PRESIDENT WASHINGTON	WHRN	2	37.0 N	130.9 W	09	26	H 45	10 NM	03	0989.3	15.0	17.2	10	29.5	25	14	42.5
ARCO PRUDHOE BAY	KPFD	3	41.9 N	150.2 W	18	32	H 50	5 NM	27	0994.0	9.4	13.3	4	8	32	10	29.5
EVER VITAL	9MCL	6	37.0 N	158.1 W	00	18	H 47	2 NM		1014.0	15.0	18.0	4	18	27	6	31
PRINCE OF TOKYO	A8GJ	6	47.5 N	148.8 W	18	30	H 63	2 NM	50	0990.0	9.5	12.0	25	41	30	25	41
PRINCE OF TOKYO	A8GJ	6	47.2 N	145.7 W	22	29	H 53	2 NM	18	0996.5	5.5	12.0	22	36	29	22	34
SEALAND ENDURANCE	KSJX	7	37.9 N	179.2 W	00	36	H 50			0991.8	13.9		5	18	26	18	29.5
PRINCE OF TOKYO	A8GJ	7	48.7 N	145.2 W	02	30	H 45	2 NM	18	1002.4	7.4	12.0	26	41	30	26	42.5
CHARLES LYKES	KLHR	7	41.0 N	174.9 E	06	27	45	5 NM	25	0989.5	5.6	8.9	7	16.5	27	14	59
CHARLES LYKES	KLHR	7	40.4 N	179.3 E	12	27	45	10 NM	81	0992.0	6.7	10.0	7	11.5	27	14	59
BAY BRIDGE	FLES7	7	46.2 N	136.0 W	18	28	H 50			1010.0	10.0	10.0	4	13	29	6	29.5
CHARLES LYKES	KLHP	7	40.0 N	173.7 E	18	26	45	10 NM	29	0992.5	6.1	10.0	8	16.5	30	15	41
CHARLES LYKES	KLHR	8	39.5 N	173.0 E	00	29	55	2 NM	82	0997.5	7.2	12.2	8	14.5	29	13	59
SEALAND ENDURANCE	KSJX	8	36.8 N	176.7 E	06	31	H 52	5 NM	82	1000.5	10.4	15.0	11	39			
CHARLES LYKES	KLHR	8	39.0 N	172.2 E	06	30	50	5 NM	29	1002.5	7.8	11.7	7	14.5	30	13	42.5
COLORADO HIGHWAY	9MTS	8	41.2 N	179.2 W	12	28	H 52	1 NM	88	0984.5	6.5	10.0	10	19.5	29	12	29.5
SEALAND ENDURANCE	KSJX	8	36.7 N	176.4 E	12	30	H 49	10 NM		1004.0	12.2	15.0	11	39			
CHARLES LYKES	KLHR	8	38.7 N	171.5 E	12	31	55	5 NM	27	1007.0	8.3	13.3	8	10	30	12	44
CHEVRON MISSISSIPPI	WXBR	8	51.3 N	150.4 W	12	15	H 50	2 NM	63	0996.5	8.3	6.1	8	32.5	15	10	41
NOSAC EXPRESS	LNEJ	9	52.7 N	168.4 E	00	34	H 50			0994.5	2.0	6.-			34	10	32.5
OCTA	A8G6	12	47.7 N	161.3 E	00	27	H 45	5 NM	61	0999.0	3.0	2.0	6	31	28	6	31
AQUA GARDEN	C6BD9	14	48.7 N	159.9 W	05	20	H 48	1 NM	68	0971.6	8.0	8.0	2	19.5	20	4	34.5
CHARLOTTE LYKES	WPHZ	20	36.0 N	171.7 W	00	27	50	5 NM	15	0998.2	14.4		11	34.5	27	11	34.5
CHARLOTTE LYKES	WPHZ	20	35.7 N	170.0 W	06	29	48	2 NM	95	1001.5	12.8	14.0	6	13	27	15	49
CHARLOTTE LYKES	WPHZ	20	35.5 N	168.1 W	12	30	45	5 NM	02	1003.8	12.8		6	13	28	14	32.5
PRESIDENT JOHNSON	WVHS	24	44.9 N	150.3 E	09	29	55	2 NM		0981.1	1.1	2.8	12	32.5	28	20	62
PRESIDENT JOHNSON	WVHS	24	44.7 N	150.2 E	12	29	55	5 NM		0984.5	0.8	2.8	12	32.5	28	20	62
PACIFIC VENTURE	HOVS	25	43.2 N	177.5 W	00	15	H 61	.5 NM	53	0949.1	7.5	7.8	9	39	16	7	6.5
PACIFIC VENTURE	HOVS	25	43.6 N	176.8 W	03	18	H 63	.5 NM	68	0961.5	9.5	7.8	9	26	14	10	29.5
AMERICAN MAINE	WPKB	25	34.2 N	147.0 W	03	14	H 47	.25 NM	63	0994.8	19.5		8	19.5	14	10	32.5
PACIFIC VENTURE	HOVS	25	43.4 N	175.5 W	06	18	H 54	.5 NM	68	0981.5	9.2	7.8	9	26	18	10	29.5
MENINA BARBARA	DZTJ	25	49.4 N	172.6 E	09	01	H 50	.5 NM		0945.0	2.0	8.5	10	39	04	18	36
SANKO RELIANCE	3EDO3	28	48.5 N	157.6 E	06	30	H 50	.5 NM	73	0987.0	0.5	0.0	6	32.5	30	6	32.5
SANKO RELIANCE	3EDO3	28	48.1 N	156.8 E	12	30	H 50	.5 NM	83	0998.5	0.0	0.0	7	8	30	8	32.5

+ Direction of sea waves same as wind
X Direction or period of waves indeterminate
H Hoscored wind

NOTE: The observations are selected from those with winds ≥ 40 kn or waves ≥ 20 ft from April through September and 45 kn or 30 ft October through March.

Closed circle indicates 0000 and open circle 1200 GMT positions. Square indicates stationary center. Cyclone tracks marked with heavy line are described in the Weather Log.

U.S. Voluntary Observing Ship Weather Reports

SHIP NAME	VIA RADIO	VIA MAIL
1ST LT ALEX BONNYMAN	9	
2ND LT.JOHN P. BOBO	9	
ACADIA	21	69
ACADIA FOREST	47	134
ACE ACCORD	5	23
ACONCOGUA	4	17
ACT 111	128	
ACT 5	86	
ACT 7	159	
ACT I	101	
ACT IV	133	
ADABELLE LYKES	82	173
ADDIRIYAH	38	31
ADM. WM. F. CALLAGHAN	18	8
ADMIRALTY BAY	17	177
ADONIS	19	148
AFRIC STAR	56	
AGUADILLA	2	
AL AHMADIAH	37	137
ALAMEDA	102	260
ALASKA MARU	69	
ALASKA RAINBOW	57	163
ALBULA	13	113
ALDEN W.CLAUSEN	20	68
ALEMANIA EXPRESS	47	
ALEUTIAN DEVELOPER	5	34
ALMERIA LYKES	25	155
ALMUDENA	10	24
ALTIMIRA	23	33
ALVA MAERSK	21	34
AMADEUS	16	
AMELIA TOPIC	31	68
AMERICA EXPRESS	74	
AMERICA SUN	62	191
AMERICAN ALABAMA	27	38
AMERICAN ALTAIR	1	
AMERICAN APOLLO	36	104
AMERICAN AQUARIUS	17	76
AMERICAN ARGO	6	10
AMERICAN ASTRONAUT	55	171
AMERICAN CONDOR	68	205
AMERICAN EAGLE	20	17
AMERICAN ENVOY	54	153
AMERICAN HAWAII		46
AMERICAN HERITAGE	15	110
AMERICAN ILLINOIS	6	32
AMERICAN KENTUCKY	17	57
AMERICAN LANCER	40	52
AMERICAN LARK	17	142
AMERICAN LEGION		35
AMERICAN LIBERTY	60	152
AMERICAN LYNX	78	31
AMERICAN MAINE	45	108
AMERICAN MARINER		84
AMERICAN MARKETER	37	118
AMERICAN MERCHANT	77	123
AMERICAN NEBRASKA	54	137
AMERICAN NEW JERSEY	7	26
AMERICAN NEW YORK	29	70
AMERICAN OKLAHOMA	26	92
AMERICAN PIONEER	76	136
AMERICAN PURITAN	54	149
AMERICAN RESERVIST	30	78
AMERICAN RESOLUTE	39	20
AMERICAN RIGEL	17	103
AMERICAN SKY	10	15
AMERICAN SPITFIRE	69	
AMERICAN TITAN AK 100R	31	64
AMERICAN TRADER		111
AMERICAN TROJAN	15	29
AMERICAN VEGA	16	37
AMERICAN VIRGINIA	26	93
AMERICAN WASHINGTON	6	4
AMERICANA	35	99
AMOCO BALTIMORE	6	11
AMOCO CAIRO	3	
AMOCO YORKTOWN	14	18
ANDERSON		29
ANJA LEONHARDT	5	
ANNIE JOHNSON	4	
AQUA CITY	102	221
AQUA GARDEN	3	50
AQUARIUS	60	190
ARCHON	14	24
ARCO ALASKA	10	14
ARCO ANCHORAGE	1	
ARCO CALIFORNIA	30	51
ARCO FAIRBANKS	23	34
ARCO HERITAGE	5	
ARCO INDEPENDENCE	7	9
ARCO PRUDHOE BAY	47	72
ARCO SAG RIVER	63	152
ARCO SPIRIT	39	86
ARCO TEXAS	40	42
ARCTIC TOKYO	2	175
ARGONAUT	25	111
ARILD MAERSK	12	45
ARMAND HAMMER	17	51
ARTHUR M. ANDERSON	138	98
ASHLEY LYKES	23	
ASIA HERON	12	
ASIA MARU	173	
ASIA WINDS	62	
ASIAN EXPRESS		16
ASPEN	81	233
ASTORIA	30	157
ATIGUN PASS	20	61
ATLANTIC RAINBOW	1	
ATLANTIC SAGA	54	
ATLANTIC SONG	52	
AUSTANGER	26	35
AUSTRAL RAINBOW	42	90
AUSTRALIA	36	
AXEL JOHNSON	17	
AZTECA	9	
B.T. ALASKA	64	291
B.T. SAN DIEGO	73	307
BALDER CARRIER	10	
BALLARD		16
BALTIMORE TRADER	95	199
BANGLAR KAKOLI	1	
BAR' ZAN	16	21
BARBER PERSEUS	77	
BARBER PRIAM	79	64
BARBER TAIF	31	
BARBER TAMPA	32	6
BARBER TEXAS	20	69
BARBER TOBA	16	39
BARBER TONSBERG	6	
BARRYDALE	25	112
BAY BRIDGE	37	67
BEAUTEOUS	5	
BEISHU MARU	86	56
BELO ORIENTE	20	31
BERNINA	31	149
BHARATENDU	15	
BIBI	93	
BIEHL TRADER		32
BLUE COSMO	57	64
BOGASARI DUA	25	69
BOGASARI EMPAT	93	252
BOGASARI LIMA	46	160
BOGASARI SATU	1	
BOHEME	52	53
BORINQUEN	110	210
BRIGHT SUN	98	203
BRINTON LYKES	8	29
BROOKS RANGE	63	60
BUFFALO		111
BUNGA CHEMPAKA	9	
BUNGA KESIDANG	6	45
BUNGA MELAWIS	57	25
BUNGA SRIPAGI	34	124
BURNS HARBOR		67
CALCITE II	104	85
CALIFORNIA BRIDGE	54	128
CALIFORNIA RAINBOW	56	
CALRICE TRANSPORT		46
CANADIAN HIGHWAY	32	32
CAP ANAMUR	49	97
CARLA A. HILLS	11	116
CAROLINE JANE	9	
CASON J. CALLAWAY	32	
CAVALIER		56
CAVARA	89	113
CECILIE MAERSK	28	76
CENPAC 2	99	
CGM LORRAINE	48	
CHABLIS	23	28
CHARLES E. WILSON		49
CHARLES LYKES	82	118
CHARLES M. BEEGHLEY	63	48
CHARLES PIGOTT		99
CHARLOTTE LYKES	83	150
CHARLOTTE MAERSK	67	173
CHASTINE MAERSK	51	142
CHELSEA	44	49
CHEMICAL PIONEER	23	83
CHERRY VALLEY	21	40
CHESAPEAKE	16	35
CHESAPEAKE TRADER	98	154
CHESNUT HILL	11	84
CHEVRON ARIZONA	35	111
CHEVRON ARNHEM	1	
CHEVRON BURNABY	59	155
CHEVRON CALIFORNIA	152	188
CHEVRON COLORADO	3	19
CHEVRON COPENHAGEN	89	184
CHEVRON EDINBURGH	22	57
CHEVRON FELUY	45	193
CHEVRON FRANKFURT	7	50
CHEVRON LONDON	10	192
CHEVRON LOUISIANA	32	70
CHEVRON MISSISSIPPI	129	192
CHEVRON OREGON	52	57
CHEVRON PACIFIC	32	173
CHEVRON WASHINGTON	53	125
CHRISTIAN MAERSK	31	94
CHRISTINA	110	
CHUEN ON	8	
CITADEL HILL	13	
CITY OF MIDLAND	16	64
CLARA MAERSK	29	129
CLEMENTINA	1	
CLIFFORD MAERSK	4	49
CLOVER TRUST	21	129
COLIMA	7	
COLORADO HIGHWAY	134	100
COLUMBIA STAR	56	84
COLUMBUS AMERICA	77	
COLUMBUS AUSTRALIA	67	
COLUMBUS CALIFORNIA	38	
COLUMBUS LOUISIANA	70	
COLUMBUS NEW ZEALAND	79	
COLUMBUS VICTORIA	77	
COLUMBUS VIRGINIA	118	
COLUMBUS WELLINGTON	113	
CONCORDIA SUN	8	27
CONDORA	1	
CONTINENTAL HIGHWAY	28	
CONTINENTAL TRADER	54	109
COOP EXPRESS II	124	102
COOP EXPRESS V	58	
CORABANK	2	
CORNELIA MAERSK	44	189
CORNUCOPIA	68	114
CRYSTAL STAR	17	72
CYGNUS	56	104
D.L. BOWER		144
DACEBANK	82	
DAGLAND	110	180
DANDY #1	1	
DART AMERICA	69	
DAVID PACKARD	21	
DAWN	65	173
DELAWARE TRADER	44	102
DELTA MAR	39	19
DIANA	1	39
DILKARA	80	
DOCTOR LYKES	13	62
DON JUAN	10	30
DREW FOSS		33
DUBHE	34	101
DUSSELDORF EXPRESS	33	
DYUI KATTEGAT	5	
DYUI SKAGERAK	11	
EASTERN FRIENDSHIP	56	154
EASTERN GLORY	35	168
EASTERN MOON	3	
EASTERN ROYAL	62	19
EASTERN VENTURE	42	61
EDGAR B. SPEER		57
EDGAR M. QUEENY	18	37
EDWIN H. GOTT		90
ELBE EXPRESS		7
ENDEAVOR		9
ERLANGEN EXPRESS	40	
ERNEST R BREECH	98	72
ESSO BAYONNE	1	
ESSO DALLAS	1	
ESSO EVERETT	1	
ESSO PALM BEACH		54
ESTHER SCHULTE	16	
EVER GATHER		30
EVER GENIUS	1	
EVER GENTLE	11	24
EVER GIFTED	11	20
EVER GLOBE	3	
EVER GLORY	7	24
EVER GOVERN	5	16

SHIP NAME	VIA RADIO	VIA MAIL
EVER GRACE	17	14
EVER GRADE		17
EVER GROWTH	2	
EVER GUARD	15	27
EVER LAUREL	39	134
EVER LEVEL	17	17
EVER LINKING	18	21
EVER LIVING	2	28
EVER LOADING	12	36
EVER LYRIC	36	9
EVER SHINE	35	63
EVER SUMMIT	39	105
EVER SUPERB	59	104
EVER TRUST	9	34
EVER VALOR	48	202
EVER VALUE	19	10
EVER VIGOR	17	62
EVER VITAL	64	109
EXPORT CHALLENGER	14	133
EXPORT CHAMPION	50	133
EXPORT FREEDOM	45	152
EXPORT PATRIOT	29	136
EXXON BALTIMORE		1
EXXON BATON ROUGE	26	26
EXXON BAYTOWN	1	10
EXXON BENICIA	8	
EXXON BOSTON	73	142
EXXON CHARLESTON	1	
EXXON GETTYSBURG	1	
EXXON HOUSTON	3	10
EXXON JAMESTOWN	33	50
EXXON LEXINGTON	32	36
EXXON NEW ORLEANS	5	4
EXXON NORTH SLOPE	59	77
EXXON PHILADELPHIA	12	19
EXXON PRINCETON	18	50
EXXON SAN FRANCISCO	21	69
EXXON WASHINGTON	3	44
FAIRWIND	2	
FALCON TRADER	26	
FALSTRIA	75	54
FEDERAL FRASER	16	
FEDERAL LAKES	42	56
FERNCROF	70	166
FETISH	1	60
FJORD STAR	43	56
FLORIDA RAINBOW	47	148
FORTALEZA	73	112
FRANCIS SINCERE NO. 6	40	18
FREDERICKSBURG	24	130
FRIENDSHIP	32	
FRONTIER ACE	1	
FROTASIPIUS	8	
GALLEON AQUAMARINE	5	
GALLEON TOURMALINE		9
GALVESTON	67	120
GARNET ACE		8
GAS LIBRA	1	
GAZANIA	4	95
GEMINI	98	124
GENERAL M.BELGRANDO	13	4
GENEVIEVE LYKES	9	103
GEORGE A. SLOAN	38	62
GEORGE A. STINSON		101
GEORGE M.MEYERHAEUSER	14	42
GERONIMO		35
GLACIER BAY	29	71
GLOBAL FRONTIER	37	90
GLOBAL PIONEER	30	191
GLOBAL SPLENDOR	38	101
GLOBAL SUN	17	
GLORE TRADER	9	
GLORIOUS SPICA	12	23
GOLDEN APO	17	
GOLDEN BLISS	37	
GOLDEN ENDEAVOR	77	77
GOLDEN GATE	20	
GOLDEN GATE BRIDGE	126	86
GOLDEN GRAMPUS	48	116
GOLDEN HAWK	67	191
GREAT LAND	33	8
GREAT OCEAN	50	52
GREEN ISLAND	10	89
GREEN MASTER	78	214
GREEN MAYA	24	44
GREEN STAR	39	17
GREEN VALLEY	75	90
GREEN WAVE	5	62
GULF KING	1	
GYPSUM COUNTESS	58	
GYPSUM KING	132	
H. LEE SELVY	55	
HAKUSAN MARU	140	
HAMANASU	4	14
HANJIN BUSAN	4	
HANJIN CHEJU		24
HANJIN INCHEON	19	39
HANJIN KUNSAN	2	
HANJIN KWANGYANG	17	61
HANJIN POHANG	28	16
HANJIN SEOUL	2	7
HARBOUR BRIDGE		16
HARDANGER	6	22
HASSAN MERCHANT	6	
HEERENGRACHT	41	42
HENRY FORD II		33
HERBERT C. JACKSON	76	44
HIEI MARU	155	
HIKAWA MARU	141	
HIRA MARU	120	
HO-SHO	23	24
HOEGH CAIRN	8	
HOEGH CLIPPER	19	
HOEGH DUKE	101	
HOEGH DYKE	25	59
HOEGH MARLIN	40	98
HOEGH MASCOT	15	102
HOEGH MINERVA	6	
HOEGH MIRANDA	7	39
HONSING ARROW	29	107
HONSING BREEZE	28	7
HONOLULU	75	
HOTAKA MARU	126	11
HOYO MARU	55	54
HYUGA MARU	54	
HYUNDAI # 14	12	
HYUNDAI #17	3	8
HYUNDAI #3	12	
HYUNDAI CON #7	21	13
IMPERIAL		7
INCOTRANS PACIFIC	44	
INCOTRANS SPIRIT	72	
INGER	36	51
IRIS ISLAND	29	
IRVING ARCTIC	44	
IRVING L. CLYMER	26	14
ISLAND PRINCESS	116	
ITALICA	9	
J.A.W. IGLEHART	34	59
J.L. MAUTHE	77	83
J.T. WIGGINS		66
JALAGOVIND	38	
JALAMOKAMBI	2	
JALAVIHAR	59	
JALAVIJAYA	47	
JAMES LYKES	9	
JAMES R. PARKER		29
JAPAN ALLIANCE	117	
JAPAN AMBROSE	82	18
JAPAN APOLLO	89	42
JEAN LYKES	11	55
JOHN A. MCCONE		108
JOHN G. MUNSON	77	50
JOHN LYKES	4	
JOSEPH L. BLOCK		82
JOSEPH LYKES	13	97
JUPITER NO. 1	98	
JUTHLANDIA	1	
KALIDAS	1	
KAMMIK	63	
KASINA	34	26
KASTURBA	26	
KAUAI	57	200
KENAI	54	21
KENNETH E. HILL	38	143
KENNETH T.DERR	3	17
KENT	12	54
KENWOOD	29	102
KEYSTONE CANYON	8	34
KEYSTONE STATE	3	37
KEYSTONER	34	137
KISO MARU	74	
KITTANNING	55	203
KNORR	95	142
KOFUKU MARU	26	95
KOLN EXPRESS	32	
KOREAN FIR	18	17
KOREAN JACEWON	54	114
KOREAN PRIDE	13	
KOREAN WONIS JIN	26	18
KOREAN WONIS ONE	16	89
KOREAN WONIS SEVEN	20	14
KOREAN WONIS SUN	30	5
KPPAN	4	
KUROBE MARU	120	
L.W. FUNKHOUSER		30
LA PAMPA	1	
LAKE SUWA	19	44
LANAI	29	
LARS MAERSK	29	62
LASH ATLANTICO	24	85
LASH ITALIA	14	102
LASH PACIFICO	29	78
LAURA MAERSK	37	98
LAURA S	49	46
LAUST MAERSK	14	70
LEDA MAERSK	30	87
LEISE MAERSK	11	31
LEO TEMPEST	14	
LESLIE LYKES	55	43
LETITIA LYKES	2	5
LEWIS WILSON FOY		126
LEXA MAERSK	22	62
LICA MAERSK	5	43
LILLOOET	34	48
LILLY STAR	20	
LING LEO	2	5
LIONS GATE BRIDGE	180	
LNG TAURUS	19	133
LONG LINES	11	31
LONTUE	4	12
LOTUS ACE	100	
LOUIS J. HANGE	5	6
LOUIS MAERSK	37	104
LOUISE LYKES	69	146
LT. ODYSSEY	25	13
LUCENT STAR	110	
LUNA MAERSK	39	100
LURLINE	65	215
LUZON	38	48
LUZON VICTORY	22	
M. P. GRACE	8	
M/S APOSIA	67	113
M/V AMER. NORTH CAROLI	10	53
M/V BHAVABHUTI	8	
M/V CURRENT	36	99
M/V DOCK EXPRESS TEXAS	14	53
M/V IZOLA	16	
M/V JUDITH PROSPERITY	41	154
M/V MAAM	20	96
M/V MICRONESIAN INDEPE	14	61
MAERSK CLEMENTINE	74	
MAERSK SENTOSA	7	
MAERSK WAVE	84	113
MAERSK WIND	50	83
MAIN EXPRESS	166	
MAJ STEPHEN W. PLESS	7	51
MALACCA	21	
MALLORY LYKES	21	61
MANILA PACIFIC	47	
MANUKAI	70	171
MANULANI	43	165
MAR CARIBE	1	
MARATHA PROVIDENCE	29	34
MARATHA SHOGUN	62	57
MARCONA CONVEYOR	2	
MARGARET JOHNSON	18	
MARGARET LYKES	108	167
MARIA TOPIC	9	
MARITIME NOBLE	71	39
MARJORIE LYKES	10	42
MARTHA R. INGRAM	69	82
MATARAM	5	
MAUI	73	202
MED TRANSPORTER	18	
MEIKO MARU	1	
MELBOURNE HIGHWAY	1	39
MELVILLE	98	144
MENINA BARBARA	29	175
MEONIA	135	43
MERAK EIGHTY	32	23
MICRONESIAN COMMERCE		84
MIHO MARU	156	
MING GALAXY	1	
MING GLORY	20	20
MING MERCY	13	
MING MOON	1	29
MING OCEAN	17	73
MING SUN	34	62
MING UNIVERSE	4	7
MIXTECO	7	42
MOANA PACIFIC	72	147
MOBIL ARCTIC	102	246
MOBIL MERIDIAN	59	170
MOKU PAHU	102	103
MONTRACHET	20	75
MORMACSTAR	28	75
MORMACSUN	20	98
MOSEL EXPRESS	135	
MOSMAN STAR	47	19
MOUNT VERNON VICTORY	22	
MYRON C. TAYLOR	86	62
NACIONAL SANTOS	6	4
NANCY LYKES	19	32
NATIONAL DIGNITY	30	93
NATIONAL HONOR	5	18
NATIONAL PRIDE		33
NAVIGATOR		39
NEDLLOYD ELBE	146	
NEDLLOYD KEMBLA	65	
NEDLLOYD KIMBERLEY	110	
NEDLLOYD KINGSTON	69	
NEDLLOYD ROCHESTER	72	
NEDLLOYD ROSARIO	44	
NEDLLOYD ROTTERDAM	45	
NEDLLOYD ROUEN	75	
NEPTUNE ALDEBARAN	1	
NEPTUNE AMBER	40	101
NEPTUNE CONCORD	35	
NEPTUNE CORAL	35	53

SHIP NAME	VIA RADIO	VIA MAIL
NEPTUNE DIAMOND	201	114
NEPTUNE KIKU	41	
NEPTUNE PEARL	43	
NEPTUNE TOURMALINE	30	145
NEW HORIZON		105
NEW INDEPENDENCE	82	247
NEW JERSEY MARU	142	
NEW YORK MARU	90	
NEWARK	44	140
NICOLA PROSPERITY	50	
NICOLET	52	64
NISSAN LAUREL	10	
NISSAN MARU	54	
NISSHU MARU	12	
NO. 6 HO MING		34
NOAA DAVID STARR JORDA	19	46
NOAA SHIP ALBATROSS IV	41	142
NOAA SHIP CHAPMAN	61	94
NOAA SHIP DAVIDSON	97	90
NOAA SHIP DELAWARE II	85	101
NOAA SHIP DISCOVERER O	29	
NOAA SHIP FAIRWEATHER	117	44
NOAA SHIP FERREL	50	54
NOAA SHIP JOHN N COBB	1	
NOAA SHIP MILLER FREEM	32	91
NOAA SHIP MT MITCHEL	163	143
NOAA SHIP OREGON II	191	226
NOAA SHIP PEIRCE	77	140
NOAA SHIP RAINIER	91	49
NOAA SHIP RESEARCHER	101	37
NOAA SHIP RUDE 590	17	15
NOAA SHIP SURVEYOR	62	72
NOAA SHIP T. CROMWELL	81	181
NOAA SHIP WHITING	124	319
NOORDAM	46	
NORDHVAL	100	53
NORSE MARSHAL	1	
NORTHERN HIGHWAY	7	
NORWAY	13	23
NOSAC EXPRESS	9	84
NOSAC SEL	4	265
NOSAC VERDE	48	
OAK PEARL	10	
OAK SUN	24	40
OAKLAND	25	19
OBERON	29	21
OCEA COMMANDER #1	1	
OCEAN CHEER	49	81
OCEAN DIANA	2	
OCEAN HOPE	4	
OCEAN STEELHEAD	30	
OCEAN VOYAGER		148
OCEANIC	45	96
OCTA	40	44
OJI GLORIA	58	
OLEANDER	83	100
OLGA TOPIC	45	150
OLIVE ACE	26	
OMI DYNACHEM	46	98
ORANGE BLOSSOM	42	92
ORCHID #2		19
OREGON BRIDGE	77	52
OREGON RAINBOW	35	122
ORIENTAL DIPLOMAT	11	
ORIENTAL EDUCATOR	73	131
ORIENTAL EXECUTIVE	35	117
ORIENTAL EXPLORER	18	156
ORIENTAL GOVERNOR	18	
ORIENTAL KNIGHT	25	29
ORIENTAL MINISTER	5	
ORIENTAL PATRIOT	29	23
ORIENTAL PRINCE	48	
ORIENTAL TATO	23	
ORION HIWAY	48	82
OVERSEAS ALASKA	1	
OVERSEAS ALICE	66	125
OVERSEAS ARCTIC	99	227
OVERSEAS BOSTON	126	194
OVERSEAS CHICAGO	2	
OVERSEAS JUNEAU	11	
OVERSEAS MARILYN	87	16
OVERSEAS NATALIE	23	50
OVERSEAS NEW YORK	54	30
OVERSEAS OHIO	18	203
OVERSEAS VIVIAN	27	57
OVERSEAS WASHINGTON	32	59
PACBARON	16	
PACBARONESS	7	19
PACDUCHESS	13	
PACDUKE	38	
PACEMPEROR	35	
PACGLORY	24	
PACIFIC ANGEL	54	61
PACIFIC APRON	170	89
PACIFIC EXPRESS	20	6
PACIFIC HIGHWAY	172	
PACIFIC LIGHT	6	28
PACIFIC PRIDE		45
PACIFIC PRINCESS	94	
PACIFIC RAINBOW	43	152
PACIFIC SAGA	21	
PACIFIC SUNSHINE		12
PACIFIC VENTURE	148	170
PACIFIC VICTORY	53	138
PACIFIC WING	57	
PACKING	21	20
PACMAJESTY	1	8
PACMERCHANT	8	11
PACMONARCH	33	
PACNOBLE	12	9
PALM ACE	15	28
PAN DYNASTY	7	
PANAMA	59	182
PARALLA	17	
PATRIOT	15	
PAUL PIGOTT	3	
PAUL THAYER		72
PECOS	3	
PEGGY DOW	164	
PENNSYLANIA RAINBOW	30	92
PENNSYLVANIA TRADER	20	89
PERSISTENT TAGOS 6		109
PERUVIAN REEFER	125	168
PETERSBURG	5	8
PFC EUGENE A.OBREGON	18	42
PFC. JAMES ANDERSON JR	50	61
PHILADELPHIA	12	3
PHILADELPHIA SUN	12	35
PHILIP R CLARKE	94	82
PHILIPPINE VICTORY	10	10
PILAR	9	92
PING CHAU		19
PITTSPURGH	57	112
PLANTIN	51	65
POLAR ALASKA	2	
POLYNESIA	155	278
PONCE	67	151
PORTLAND	40	72
POTOMAC TRADER	59	154
PRESIDENT ADAMS	41	64
PRESIDENT CLEVELAND	39	42
PRESIDENT EISENHOWER	49	153
PRESIDENT F. ROOSEVELT	1	
PRESIDENT F.D. POOSEVE	82	136
PRESIDENT FILLMORE	1	
PRESIDENT GRANT	70	164
PRESIDENT HOOVER	34	145
PRESIDENT JACKSON	65	123
PRESIDENT JEFFERSON	47	103
PRESIDENT JOHNSON	95	204
PRESIDENT KENNEDY	24	15
PRESIDENT LINCOLN	68	146
PRESIDENT MADISON	60	39
PRESIDENT MC KIMLEY	105	185
PRESIDENT MONROE	55	76
PRESIDENT TAYLOR	25	54
PRESIDENT TYLER	63	114
PRESIDENT WASHINGTON	135	144
PRESIDENT WILSON	27	52
PRESQUE ISLE		123
PRINCE OF TOKYO	54	233
PRINCE WILLIAM SOUND	33	86
PROSPERIDAD	64	
PUERTO RICO	1	
PUNTA BRAVA	8	
PVT. HARRY FISHER	1	127
QUATSINO SOUND	46	132
QUEEN ELIZABETH II	34	
QUEEN OPAL	91	17
QUEENS WAY BRIDGE	119	
RAINBOW HOPE		264
RAPID	23	67
RED ARROW	31	
REGENT CEDAR	1	
REGINA MAERSK	34	91
RHEIN EXPRESS	44	
RIO ARAUCAN	1	
RIO ESQUEL	29	20
RIO FRIO	31	
RIO GRANDE	2	
RIO LUNDE	6	
RIO TFUCO	4	
ROACHBANK	68	
ROBERT D. CONRAD		31
ROBERT E. LEE	29	29
ROMAN REEFER		56
ROSINA TOPIC	29	60
ROTTERDAM	83	
ROYAL PRINCESS	165	
ROYAL VIKING SEA	3	
ROYAL VIKING SKY	15	10
RUHR EXPRESS	56	
RUTH LYKES	2	
S.S. PAYAMON		2
S.S. PORTLAND		15
S.S. POVER	19	86
S.S.CHILBAR	3	
S.T. CRAPO	48	64
SAINT LOUIS	41	185
SAM HOUSTON	15	32
SAMPAT ASHOK	65	
SAMUEL H. ARMACOST	12	14
SAN JUAN	85	203
SAN MATEO VICTORY	2	97
SAN PEDRO	11	
SANGKULIRANG VIT	47	
SANKO AMETHYST	5	64
SANKO ANTARES	6	
SANKO AZALEA	49	210
SANKO CONDOR	34	
SANKO CYCLAMAN	8	
SANKO DENEB	9	
SANKO DRAKE	6	32
SANKO ELEGANCE	6	
SANKO ETERNITY	7	
SANKO HELIANTHUS	5	
SANKO LAPIS	41	
SANKO LILY	23	27
SANKO MARQUESA	13	21
SANKO NOBLE		10
SANKO PEARL	31	15
SANKO RELIANCE	33	57
SANKO STORK	3	28
SANKO SWALLOW	1	
SANKO SWIFT	5	
SANKO TURQUOISE	21	
SANKO VENUS	40	
SANTA ADELA	81	204
SANTA CRUZ II	68	
SANTA ELIZABETTA		36
SANTA JUANA	114	201
SAPPHIRE GLORY	51	152
SATURN DIAMOND	46	39
SAUDI DIRIYAH	31	
SAVONITA	54	208
SCANDINAVIAN HIGHWAY	143	
SEA BELLS	24	86
SEA DIAMOND	68	94
SEA FAN	47	71
SEA FORTUNE	24	126
SEA JADE	57	28
SEA LANTERN	19	47
SEA LIGHT	4	98
SEA QUEEN	28	
SEALAND ADVENTURE	1	
SEALAND ADVENTUPER	52	167
SEALAND CONSUMER	55	212
SEALAND DEFENDER	59	151
SEALAND DEVELOPER	40	167
SEALAND ECONOMY	50	143
SEALAND ENDURANCE	57	144
SEALAND EXPLORER	52	154
SEALAND EXPRESS	39	96
SEALAND FREEDOM	47	147
SEALAND INDEPENDENCE	59	131
SEALAND INNOVATOR	78	168
SEALAND LEADER	33	141
SEALAND LIBERATOR	36	174
SEALAND MARINER	53	181
SEALAND PACER	25	183
SEALAND PATRIOT	65	133
SEALAND PIONEER	19	90
SEALAND PRODUCER	64	185
SEALAND VENTURE	48	117
SEALAND VOYAGER	51	155
SEDCO/BP 471	103	101
SELVA	17	
SENATOR	11	22
SEVEN OCEAN	33	52
SGT.MATEJ KOCAK	38	97
SHELDON LYKES	94	178
SHELLY BAY	2	141
SHENAHON	3	2
SHIN REISHU MARU	50	
SHINKASHU MARU	45	
SHIRLEY LYKES	13	
SILVER CLIPPER	17	38
SIOUX TATE	17	
SKAUGRAN	43	175
SKOUBORG	29	181
SOLON TURMAN	13	101
SOUTHERN CROSS	12	19
SOUTHLAND STAR	165	
SPARROWS POINT	54	22
SPRING BIRD	48	28
SPRING BREEZE		213
SPRING BRIDE		240
SPRING DESIRE	20	24
STAR DENVER	1	
STAR DIEPPE	64	
STAR DOVER	34	
STAR EAGLE	88	
STAR HONGKONG	45	163
STAR KANDA	128	139
STAR MINDANAN	4	
STAR THAILAND	19	101
STARWARD	11	47
STELLA LYKES	18	55
STONEWALL JACKSON	10	30
STREAM PUSUANGA	70	
STUTTGART EXPRESS	32	
SUGAR ISLANDER	17	16

SHIP NAME	VIA RADIO	VIA MAIL
SUN PRINCESS	68	
SUN VIKING	2	
SUNBELT DIXIE	162	199
SUNSET PEAK	30	40
TAI CORN	1	
TAI LIENG	1	
TENCHBANK	103	
TEXACO CALIFORNIA		27
TEXACO CONNECTICUT	10	18
TEXACO FLORIDA	10	
TEXACO GEORGIA	25	47
TEXACO RHODE ISLAND	19	50
TEXAS SUN	4	
TEXAS TRADER	65	
TFL DEMOCRACY	17	119
TFL ENTERPRISE	33	161
TFL EXPRESS	22	113
TFL FRANKLIN	77	
TFL FREEDOM	36	155
TFL INDEPENDENCE	21	132
TFL JEFFERSON	13	142
TFL LIBERTY	45	181
THAMES		17
THOMAS G. THOMPSON	85	97
THOMAS WASHINGTON	118	219
THOMPSON LYKES	15	35
THOMPSON PASS	31	102
TILLIE LYKES	29	47
TOKEI MARU	93	
TOKYO MARU	52	
TOKYO RAINBOW	54	41
TONCI TOPIC	22	142
TONIC VENTURE	3	
TONSONIA	56	240
TOWER BRIDGE	112	
TOYOTA MARU 10	77	
TOYOTA MARU 11	104	
TOYOTA MARU 15	183	
TOYOTA MARU NO 17	57	
TOYOTA MARU NO 18	116	
TRANSOCEAN PROGRESS	56	
TRAVE OPE	64	75
TRIGGER	71	58
TRITON	44	225
TROLL LAKE	1	
TROPIC SUN	6	30
TROPICALE	55	80
TYSON LYKES	80	168
ULTRAMAR	7	
UNAMONTE	18	64
UNI-MASTER	76	53
UNI-MERCY	3	
UNI-MODEST	87	50
UNICORN	1	259
UNITED SPIRIT	56	22
UNIVERSE	3	
USCGC ACUSHNET WMEC 16	5	
USCGC ALERT (WMEC 630)	37	
USCGC BASSWOOD (WLB 38	109	66
USCGC BOUTWELL WMEC 71	3	
USCGC BRAMBLE (WLB 392	18	
USCGC CHASE (WMEC 718)	1	17
USCGC CITRUS (WMEC 300	1	17
USCGC CLOVER (WMEC 292	2	3
USCGC CONFIDENCE		4
USCGC COURAGEOUS	9	
USCGC DALLAS (WMEC 716	2	
USCGC DEPENDABLE	37	
USCGC DILIGENCE WMEC 6	9	
USCGC DURABLE (WMEC 62	20	70
USCGC EAGLE (WIX 327)	6	
USCGC GALLATIN WMEC 72	3	
USCGC GLACIER (WAGB 4)	83	
USCGC IRONWOOD (WLB 29	16	
USCGC KATMAI BAY	1	1
USCGC LAUREL (WLB 291)	2	19
USCGC MALLOW (WLB 396)	4	
USCGC MIDGETT (WMEC 72	1	17
USCGC MORGENTHAU	73	
USCGC MUNRO (WMEC 724)	8	14
USCGC NORTHWIND WAGB 2	56	155
USCGC PLANETREE WLB 30	40	
USCGC POLAR SEA WAGB 1	38	
USCGC POLAR STAR WAGB	134	86
USCGC RELIANCE WMEC 61	29	
USCGC RUSH (WMEC 723)	2	
USCGC SEDGE (WLB 402)	13	
USCGC SHERMAN (WMEC 72	23	
USCGC STEADFAST WMEC 6	5	
USCGC SUNDEW (WLB 404)	4	17
USCGC SWEETBRIER WLB 4	2	
USCGC TAMAROA (WMEC 16	74	97
USCGC TANEY (WHEC 37)	5	
USCGC UNIMAK (WTR 379)	51	
USCGC VALIANT (WMEC 62	15	
USCGC VIGILANT WMEC 61	42	
USCGC VIGOROUS WMEC 62	22	
USCGC WOODRUSH (WLB 40	14	
USCGC YOCONA (WMEC 168	8	
USGS S.P. LEE	4	9
USNS ALGOL	1	
USNS APACHE (T-ATF 172	1	
USNS BARTLETT(T-AGOR 1	83	118
USNS CAPELLA	13	
USNS CHAUVENET	93	161
USNS DE STEIGUER	55	40
USNS HARKNESS (T-AGS 3	51	
USNS KANE TAGS 27	10	112
USNS LYNCH (T-AGOR 7)	40	
USNS MOHAWK (T-ATF 170	15	36
USNS NAVAJO	23	30
USNS NEOSHO (T-AO 143)		118
USNS PONCHATOULA	30	
USNS POWHATAN TATF 166	11	199
USNS RANGE SENTINEL		9
USNS SATURN		1
USNS SEALIFT ANTARCTIC	1	57
USNS SEALIFT ARCTIC	65	107
USNS SEALIFT CARIBBEAN	4	
USNS SEALIFT CHINA SEA	83	85
USNS SEALIFT MED	14	65
USNS SEALIFT PACIFIC	60	40
USNS SIRIUS (T-AFS 8)		40
USNS SPICA (T-AFS 9)		47
USNS TRUCKEE (T-AO 147		172
USNS VANGUARD TAG 194	81	157
USNS WACCAMAW(TAO-109)		99
USNS WILKES	3	150
VALLEY FORGE	25	112
VAN FORT	67	123
VAN HAWK	76	119
VAN WARRIOR	55	3
VENTURE STAR	79	99
VICTORY ACE	33	55
VISHVA PAROS	3	
VISHVA PRAFULLA	33	
VISHVA SIDDHI	2	
W.C. VAN HORNE	60	
WASHINGTON RAINBOW 82	66	72
WASHINGTON TRADER	61	65
WELLINGTON STAR	148	
WESTERN HIGHWAY	67	
WESTERN SUN	10	
WESTOCEAN	129	
WESTWARD VENTURE	6	23
WILLIAM B. BAUGH	45	78
WILLIAM E. MUSSMAN	49	198
WILLIAM J. DELANCEY		140
WILLIAM R. ROESCH		87
WILLOWBANK	103	
WOLVERINE		52
WOOD STAR	9	
YAMASHIN MARU	122	34
YASHIMA MARU	117	34
YE LAN	24	20
YOUNG SCOPE	84	
YOUNG SPROUT	114	194
YUKO MARU	5	
ZAPATA ARCTIC	68	
ZAPATA COURIER	29	
ZEELANDIA	118	
ZEPHUNTER	13	
ZIM GENOVA	51	
ZIM HAIFA	35	
ZIM HONGKONG	46	
ZIM HOUSTON	8	
ZIM IBERIA	62	
ZIM KEELUNG	33	
ZIM MARSEILLES	20	
ZIM MIAMI	50	
ZIM NEW YORK	37	
ZIM SAVANNAH	59	
ZIM TOKYO	40	
ZOELLA LYKES	29	46

SUMMARY: GRAND TOTAL VIA RADIO 39772 GRAND TOTAL VIA MAIL 57942 TOTAL UNIQUE OBS 80276

BATHY-TESAC Data Received at NMC

October, November and December 1985

This listing represents BATHY-TESAC messages received at the Specialized Oceanographic Center (SOC), located at the U.S. National Meteorological Center (NMC). These ships participate in the collection and exchange of Integrated Global Ocean Services System (IGOSS) Data on the Global Telecommunications System (GTS).

Additional information on this program can be obtained by contacting:

John J. Kundrat, Jr.
National Meteorological Center
Room 206
Camp Spring, Maryland 20233
Phone 301-763-8133

THESE DATA WERE PUBLISHED IN THE LAST ISSUE. THE NEXT ISSUE WILL CONTAIN THE JANUARY, FEBRUARY AND MARCH DATA. THIS TABLE WILL THEN COINCIDE WITH THE REST OF THE LOG.

U.S. NDBC Climatological Data

October, November and December 1985

OCTOBER 1985			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	732	31	25.3	02 21	17.4	29 18	22.7	732	31	25.7	02 19	23.0	30 10	24.1	732	31	00.8	15 14	-05.8	29 18	-01.4
41002	32.3N	075.3W	742	31	27.1	16 21	20.3	30 15	25.1	742	31	27.1	16 21	25.2	08 19	26.1	742	31	00.5	11 15	-05.2	05 15	-01.1
41006	29.3N	077.3W	741	31	27.6	04 20	22.1	30 13	25.9	740	31	27.6	14 19	25.0	09 22	26.4	741	31	01.1	10 12	-04.6	30 13	-00.6
42001	25.9N	089.7W	739	31	29.4	04 23	22.1	30 06	26.4	739	31	29.6	04 22	26.0	31 07	27.9	740	31	00.3	04 23	-05.4	22 18	-01.6
42002	26.0N	093.5W	740	31	25.7	04 15	17.9	31 03	23.4	740	31	30.7	15 21	27.2	31 13	29.0	740	31	-03.6	04 15	-09.5	31 03	-05.5
42003	26.0N	085.9W	737	31	31.3	02 05	24.7	29 22	28.9	738	31	30.4	04 21	26.9	31 14	28.1	743	31	02.9	02 05	-02.7	29 22	00.7
42007	30.1N	088.9W	471	31	27.0	15 17	15.3	02 12	23.1	471	31	25.1	04 21	20.7	11 13	23.5	478	31	03.9	15 14	-08.7	02 11	-00.4
44005	42.7N	068.3W	742	31	17.5	02 21	04.1	29 11	12.2	742	31	15.6	02 19	11.1	30 09	13.3	742	31	02.6	06 01	-07.3	29 11	-01.0
44007	43.5N	070.1W	738	31	17.7	11 02	02.1	29 11	11.5	738	31	15.2	02 19	09.8	29 10	12.3	739	31	04.6	27 22	-08.0	29 11	-00.8
44008	40.5N	069.4W	741	31	21.9	01 18	06.0	29 12	14.4	741	31	18.9	01 21	12.8	29 12	15.2	741	31	05.1	01 18	-07.8	13 07	-00.8
44009	38.5N	074.6W	741	31	22.8	15 22	08.7	29 09	17.7	740	31	21.9	01 20	16.4	31 10	19.2	742	31	02.5	15 22	-08.2	29 09	-01.5
44011	41.1N	066.6W	741	31	22.6	05 19	06.5	29 15	14.0	741	31	22.7	05 08	11.3	29 09	14.0	741	31	07.4	02 17	-07.2	29 15	00.0
44012	38.8N	074.6W	741	31	22.7	10 20	07.6	29 09	17.6	736	31	21.3	01 18	16.4	31 10	19.1	744	31	02.4	10 20	-09.1	29 09	-01.4
44013	42.4N	070.8W	743	31	20.9	01 19	02.2	29 13	12.3	743	31	17.1	01 20	10.9	29 12	13.1	743	31	07.9	27 19	-08.7	29 13	-00.7
45001	48.0N	087.6W	726	31	10.6	08 22	01.5	16 16	06.5	726	31	07.5	04 21	05.9	28 07	06.6	737	31	03.8	26 23	-05.1	16 16	-00.1
45002	45.3N	086.3W	739	31	15.3	08 07	05.1	28 08	10.7	740	31	15.7	01 01	11.8	28 11	12.9	740	31	02.3	18 03	-08.2	01 13	-02.2
45003	45.3N	082.8W	743	31	15.3	01 02	03.2	28 16	10.4	743	31	15.1	01 02	10.5	29 05	12.2	743	31	03.7	24 22	-07.6	28 16	-01.8
45004	47.2N	086.5W	735	31	12.2	14 02	02.4	16 14	07.6	734	31	09.5	03 22	07.1	17 09	07.8	736	31	04.6	14 02	-04.9	16 14	-00.2
45006	47.3N	090.0W	742	31	10.5	17 21	02.4	09 12	06.7	742	31	07.9	03 22	05.0	09 22	05.9	742	31	05.3	23 10	-03.4	01 09	00.8
45007	42.7N	087.1W	741	31	16.4	08 02	06.2	16 12	11.6	741	31	15.6	01 01	09.8	09 07	12.8	742	31	03.7	08 10	-08.1	01 14	-01.2
45008	44.3N	082.4W	734	31	15.6	01 02	05.0	28 14	10.5	733	31	14.1	01 01	09.7	31 03	11.0	741	31	04.3	24 22	-05.2	28 19	-00.4
46001	56.3N	148.3W	743	31	11.3	08 10	-03.9	26 17	08.3	743	31	10.7	01 01	06.6	31 16	08.9	743	31	01.4	08 10	-11.7	26 17	-02.6
46002	42.5N	130.3W	740	31	17.4	05 22	11.1	27 21	15.1	740	31	17.0	05 23	15.0	30 16	16.1	741	31	00.9	26 17	-04.4	27 21	-01.0
46003	51.9N	155.9W	742	31	13.3	08 00	01.4	26 17	08.1	742	31	11.2	01 02	07.6	29 08	09.3	743	31	02.7	08 00	-06.6	26 17	-01.3
46004	50.9N	135.9W	739	31	14.2	04 02	00.8	27 15	10.5														
46005	46.1N	131.0W	351	19	17.4	04 21	10.2	21 04	14.2	351	19	16.0	05 00	13.8	22 10	15.1	510	22	01.5	04 21	-04.1	21 04	-01.3
46006	40.8N	137.6W	742	31	18.1	05 20	10.6	20 14	16.0	742	31	18.1	02 22	15.8	30 15	16.9	742	31	01.1	26 07	-04.1	20 14	-00.9
46010	46.2N	124.2W	680	31	16.6	05 01	06.8	29 15	11.8	679	31	14.6	05 21	10.3	09 14	12.0	686	31	03.4	05 00	-04.4	29 15	-00.2
46011	34.9N	120.9W	743	31	22.2	04 01	12.0	27 15	14.8	743	31	18.7	04 00	13.0	15 12	14.8	743	31	06.2	15 09	-02.8	17 18	00.0
46012	37.4N	122.7W	740	31	25.6	03 19	11.5	16 06	13.9	741	31	16.8	05 00	12.6	23 15	13.7	741	31	10.5	03 19	-01.9	01 11	00.2
46013	38.2N	123.3W	741	31	16.8	05 00	10.0	17 18	12.4	741	31	14.5	04 00	10.0	18 16	11.7	742	31	03.3	04 16	-02.2	02 11	00.6
46014	39.2N	124.0W	743	31	18.0	04 19	09.1	29 16	12.2	743	31	16.3	06 01	10.4	13 02	12.3	743	31	03.6	04 19	-03.6	06 08	-00.1
46016	63.3N	170.3W	238	31	05.2	06 03	-11.6	26 18	-02.4														
46017	60.3N	172.3W	206	31	07.3	05 06	-05.6	24 21	00.9														
46022	40.8N	124.5W	741	31	17.1	05 23	09.3	26 14	12.0	741	31	15.2	06 00	10.2	20 18	11.5	742	31	07.5	05 22	-02.8	26 14	00.6
46023	34.3N	120.7W	742	31	23.1	03 23	13.0	09 14	15.5	742	31	19.6	04 01	14.2	23 12	15.9	742	31	05.2	05 06	-03.7	09 14	-00.4
46024	32.8N	119.5W	278	12	25.2	04 23	12.3	09 20	18.6	278	12	21.9	04 22	18.9	01 14	19.6	278	12	04.5	04 23	-07.0	09 20	-01.1
46025	33.6N	119.0W	741	31	25.0	15 23	15.2	21 10	18.2	741	31	21.7	03 22	18.8	31 08	19.7	742	31	04.7	15 23	-04.4	21 10	-01.5
46026	37.8N	122.7W	743	31	24.6	04 00	09.9	16 16	13.0	743	31	17.8	05 00	11.5	09 09	13.7	743	31	08.3	03 16	-03.6	06 01	-00.7
46027	41.8N	124.4W	349	15	13.7	27 20	08.1	21 04	10.6	349	15	11.7	25 22	09.7	17 20	10.7	349	15	02.4	20 14	-02.4	30 12	-00.1
46028	35.8N	121.7W	742	31	21.7	04 00	12.1	29 14	14.6	742	31	18.1	04 23	12.1	31 17	15.1	742	31	05.6	04 00	-02.6	26 16	-00.4
46030	40.4N	124.5W	740	31	18.8	04 22	09.0	10 09	11.4	741	31	13.9	05 04	10.0	16 12	11.5	742	31	06.9	04 22	-03.0	21 03	-00.1
46035	57.0N	177.7W	724	31	08.8	07 00	00.6	29 17	04.9	673	29	08.7	04 02	05.1	31 06	07.1	673	29	01.7	19 19	-06.4	03 20	-02.2
51001	23.4N	162.3W	744	31	26.8	22 00	21.9	16 12	25.4	744	31	27.1	04 01	25.6	31 13	26.3	744	31	00.0	20 20	-04.3	16 12	-01.0
51002	17.2N	157.8W	743	31	26.7	21 02	22.0	18 17	25.7	743	31	27.8	02 00	26.5	31 10	26.9	743	31	-00.4	08 20	-04.8	18 17	-01.2
51003	19.2N	160.8W	741	31	27.7	19 03	23.0	12 07	26.4	741	31	28.7	19 03	27.0	14 11	27.4	741	31	00.1	18 18	-04.3	12 07	-01.0
51004	17.5N	152.6W	741	31	26.7	05 02	23.6	29 03	25.6	741	31	26.8	05 00	26.0	11 12	26.3	741	31	00.1	05 21	-02.8	29 03	-00.8
ALRF1	24.9N	080.6W	738	31	29.1	02 21	23.7	19 09	27.1	738	31	29.3	11 21	26.8	26 08	27.8	739	31	00.7	29 18	-04.1	07 08	-00.8
ALSN6	40.5N	073.8W	743	31	23.1	19 21	04.8	29 10	15.2														
BURL1	28.9N	089.4W	579	26	29.3	04 22	18.3	31 22	24.6														
BUZM3	41.4N	071.0W	744	31	23.0	02 16	02.8	29 11	14.3														
CARO3	43.3N	124.4W	717	31	16.7	05 06	04.4	29 14	11.3														
CHLV2	36.9N	075.7W	110	07	23.4	02 19	12.1	29 22	19.1	110	07	23.2	02 19	19.1	31 06	20.9	110	07	00.5	02 17	-07.5	29 22	-01.7
CLKN7	34.6N	076.5W	737	31	25.4	03 14	09.8	31 08	21.3														
CSBF1	29.7N	085.4W	696	30	28.7	18 21	14.6	06 12	24.3														
DBLN6	42.6N	079.5W	647	28	22.3	04 22	03.8	17 08	13.3														
DESW1	47.7N	124.5W	743	31	14.0	05 02	04.0	29 13	10.5														
DISW3	47.1N	090.7W	743	31	16.5	02 21	01.6	09 13	07.9														
DSLN7	35.2N	075.3W	744	31	27.0	02 14	16.8	29 20	22.4														
FBIS1	32.7N	079.9W	743	31	28.0	05 18	13.3	29 10	22.2														
FFIA2	57.3N	133.6W	742	31	10.6	01 01	01.4	27 23	05.9														
FPSN7	33.5N	077.6W	740	31	26.7	16 16	17.4	06 12	23.5														
GDIL1	29.3N	089.9W	739	31	28.3	04 20	15.2	02 13	24.0	739	31	28.1	21 21	21.1	02 16	25.3	739	31	04.0	04 20	-07.7	02 12	-01.3
GLLN6	43.9N	076.4W	736	31	18.4	01 02	-00.1	29 10	12.0														
IOSN3	42.9N	070.6W	744	31	20.3	10 20	01.7	29 12	11.6														
LKWF1	26.6N	080.0W	743	31	28.3	06 00	23.3	10 11	26.8	743	31	28.9	13 22	26.4	25 08	27.6	743	31	00.5	31 15	-04.1	19 22	-00.9
MDRM1	44.0N	068.1W	744	31	15.7	06 03	01.8	29 12	10.6														
MISM1	43.8N	068.9W	744	31	15.9	11 00	01.8	29 12	10.8														
NWPO3	44.6N	124.1W	731	31	17.8	04 17	04.2	08 09	10.4														
PILM4	48.2N	088.4W	739	31	11.9	26 21	01.1	16 13	06.8														
PTAC1	38.9N	123.7W	743	31	18.7	04 15	04.8	09 14	11.6														
PTAT2	27.8N	097.1W	728	31	27.2	14 21	13.4	01 17	23.6														
PTGC1	34.6N	120.7W	645	31	25.0	03 22	11.5	13 11	15.0														
ROAM4	47.9N	089.3W	629	30	13.5	26 21	02.2	16 17	07.0														
SBIO1	41.7N	082.8W	743	31	20.1	08 23	06.6	28 11	13.4														
SGNW3	43.8N	087.7W	740	31	17.4	27 03	02.4	16 13	09.1	175	08	11.2	29 18	09.5	26 11	10.0	175	08	07.1	26 16	-03.7	28 18	00.0
SISW1	48.3N	122.9W	740	31	15.0	15 23	04.5	29 15	10.1														
SJLF1	30.4N	081.4W	744	31	31.3	04 19	14.9	06 12	24.4														
SPGF1	26.7N	079.0W	011	06	25.0	25 02	23.2	29 17	24.7	192	08	28.8	30 19	27.1	31 13	27.7	185	08	-02.1	31 13	-05.1	29 21	-02.9
SRST2	29.7N	094.1W	743	31	26.3	18 19	13.1	05 12	21.7														
STDM4	47.2N	087.2W	736	31	12.9	26 21	02.6	27 16	07.7														
SVLS1	31.9N	080.6W	602	30	24.5	14 19	16.1	29 13	22.5														
TPLM2	38.9N	076.4W	136	07	20.5	25 20	05.3	29 13	13.5	123	06	17.7	27 16	14.4	29 11	16.2	134	06	01.9	27 20	-09.4	29 17	-03.2
TTIW1	48.4N	124.7W	742	31	13.8	05 20	05.6	26 10	09.9														
WPOW1	47.7N	122.4W	742	31	15.3	02 22	04.3	29 15	10.7														

OCTOBER 1985			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41002	32.3N	075.3W	736	5.0	29 15	2.0	2.1	41.3	37.9	14.9	3.6			
41006	29.3N	077.3W	732	6.0	09 21	1.8	0.1	63.6	28.1	7.1	3.8	0.1		
42001	25.9N	089.7W	736	7.0	29 13	1.6	20.5	57.3	4.8	3.8	12.3	1.0		
42002	26.0N	093.5W	737	7.0	29 00	1.9	8.4	59.5	11.2	3.6	13.9	3.1		
42003	26.0N	085.9W	713	4.5	31 17	1.4	30.2	45.7	9.6	9.6	4.6			
42007	30.1N	088.9W	333	3.0	29 18	0.8	54.0	43.5	2.1	0.3				
44005	42.7N	068.3W	737	4.0	29 02	1.4	17.9	52.1	21.4	7.5	0.9			
44007	43.5N	070.1W	663	2.8	05 28	0.7	60.9	38.3	0.7					
44011	41.1N	066.6W	740	4.5	26 19	1.7	13.9	45.5	26.6	9.1	4.7			
45001	48.0N	087.6W	677	4.5	01 00	1.2	29.3	50.9	17.4	1.3	0.8			
45002	45.3N	086.3W	689	4.5	08 17	1.1	38.6	42.9	15.6	1.8	0.8			
45003	45.3N	082.8W	674	3.5	05 23	1.1	28.4	54.5	15.4	1.4				
45004	47.2N	086.5W	686	4.0	08 14	1.1	36.8	44.0	15.8	2.4	0.7			
45006	47.3N	090.0W	640	3.5	01 00	0.8	52.4	39.6	6.7	0.9				
45007	42.7N	087.1W	287	2.5	05 08	1.1	30.3	56.0	13.5					
45008	44.3N	082.4W	665	3.0	05 22	1.0	37.8	48.8	12.3	0.9				
46001	56.3N	148.3W	741	7.5	09 20	3.2		11.4	23.7	30.4	31.4	2.8		
46002	42.5N	130.3W	738	6.5	20 14	2.8		12.8	40.2	30.6	15.0	1.2		
46003	51.9N	155.9W	740	8.5	18 12	3.7		6.5	21.0	26.3	32.9	10.5	0.8	
46004	50.9N	135.9W	736	7.0	22 16	3.5		3.5	23.5	31.2	38.3	3.3		
46005	46.1N	131.0W	343	7.0	21 04	2.2		34.1	40.2	16.6	8.7	0.2		
46006	40.8N	137.6W	738	7.0	20 18	2.4		22.6	40.1	22.4	12.1	2.5		
46010	46.2N	124.2W	643	6.0	22 06	2.4	2.7	26.4	35.1	24.2	11.0	0.3		
46011	34.9N	120.9W	740	3.5	22 10	1.9		46.3	47.5	6.0				
46012	37.4N	122.7W	740	3.5	08 03	1.9		46.8	42.2	10.8				
46013	38.2N	123.3W	720	4.0	12 22	2.1		35.0	42.6	21.5	0.8			
46014	39.2N	124.0W	740	4.5	13 01	2.4		20.5	48.3	25.4	5.6			
46022	40.8N	124.5W	733	4.5	09 08	2.4		17.8	52.2	23.8	6.0			
46023	34.3N	120.7W	738	4.0	13 09	2.2		31.1	42.6	25.2	0.8			
46024	32.8N	119.5W	275	3.0	08 17	1.6		64.0	35.6	0.3				
46025	33.6N	119.0W	738	2.0	07 02	1.0	14.2	82.1	3.6					
46026	37.8N	122.7W	736	3.0	21 07	1.5		67.3	32.2	0.4				
46027	41.8N	124.4W	471	8.0	22 04	1.9		8.0	35.6	23.1	7.0			23.1
46028	35.8N	121.7W	738	4.0	08 10	2.2		35.5	36.0	27.9	0.5			
46035	57.0N	177.7W	723	10.5	29 21	3.0		27.1	31.2	18.2	12.0	9.5	1.6	0.1
51001	23.4N	162.3W	741	5.0	28 12	2.2		19.5	61.6	15.6	3.1			
51002	17.2N	157.8W	739	3.5	08 08	2.1		21.2	67.1	11.6				
51003	19.2N	160.8W	741	4.0	26 08	1.9		39.8	48.9	11.0	0.1			
51004	17.5N	152.6W	734	4.5	29 06	2.1		14.1	78.4	8.0	1.3			
CHLV2	[illegible]	075.7W	109	2.5	31 21	1.1	40.3	45.8	13.7					

OCTOBER 1985			PRESSURE (MB)							WIND SPEEDS (KNOTS)				MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	732	31	1033.1	18 13	1007.2	31 17	1020.7	729	26	23 00	040	11.4	13.7	12.7	10.5	10.0	10.6	6.6	7.7	11.0
41002	32.3N	075.3W	742	31	1029.9	18 16	1007.2	31 21	1019.4	736	29	29 14	080	9.8	16.9	13.0	11.4	12.4	10.2	8.6	6.3	13.0
41006	29.3N	077.3W	741	31	1025.8	18 15	1006.0	31 22	1017.3	740	31	09 21	030	11.3	12.3	10.5	10.8	9.3	10.3	3.4	5.0	10.5
42001	25.9N	089.7W	696	31	1020.0	09 16	998.3	27 08	1013.5	739	37	27 19	190	12.8	11.2	12.7	11.7	12.9	23.0	23.2	11.3	14.0
42002	26.0N	093.5W	740	31	1021.4	09 16	[illegible]	27 08	1013.2	740	43	28 23	240	19.7	17.6	12.6	14.0	8.2	10.5	34.6	30.3	17.6
42003	26.0N	085.9W	738	31	1022.1	18 15	996.5	31 10	1014.2	736	35	31 11	220	14.6	14.7	15.4	12.0	10.6	25.0	10.7	9.5	15.9
42007	30.1N	088.9W	461	30	1024.2	18 16	993.0	30 19	1017.0	468	32	29 17	340	11.9	12.8	11.1	9.1	9.7	7.6	10.4	7.3	10.9
44005	42.7N	068.3W	742	31	1037.1	18 11	1002.4	06 06	1020.3	738	26	28 21	310	11.3	9.5	9.1	10.1	9.6	12.5	11.3	14.8	11.8
44007	43.5N	070.1W	738	31	1036.0	18 10	1001.3	06 03	1020.0	721	29	29 04	340	11.9	8.4	6.3	11.5	11.5	12.5	11.3	13.0	11.4
44008	40.5N	069.4W	741	31	1036.3	18 13	1003.4	06 02	1020.5	689	27	29 01	330	13.1	7.2	6.9	3.9	9.8	12.2	11.6	13.0	09.9
44009	38.5N	074.6W	740	31	1035.8	18 02	1006.7	05 19	1022.2	714	25	31 20	040	11.3	14.6	8.4	7.0	10.1	11.9	8.6	10.1	11.1
44011	41.1N	066.6W	741	31	1037.6	18 14	1003.3	06 00	1020.5	735	24	26 17	300	11.4	7.3	6.7	6.2	8.1	11.7	9.0	13.7	10.4
44012	38.8N	074.6W	740	31	1035.9	18 12	1006.3	05 19	1022.1	720	27	31 20	040	12.1	13.4	11.6	7.9	11.2	11.7	8.7	11.6	11.4
44013	42.4N	070.8W	743	31	1036.3	08 16	1002.3	05 21	1021.1	739	23	11 08	330	9.6	11.5	7.5	6.9	10.6	10.4	11.1	12.1	10.6
45001	48.0N	087.6W	731	31	1032.4	28 16	999.5	05 06	1015.6	722	37	01 00	040	14.9	12.0	14.3	12.4	11.0	13.5	14.2	14.4	13.2
45002	45.3N	086.3W	739	31	1033.2	28 17	994.0	05 04	1017.7	633	33	04 15	190	10.0	8.3	12.6	11.7	16.3	14.5	15.1	14.2	13.7
45003	45.3N	082.8W	740	31	1032.7	28 17	994.2	05 12	1018.1	732	27	05 23	300	8.7	7.3	9.2	11.5	11.1	12.3	13.9	15.6	12.0
45004	47.2N	086.5W	733	31	1033.2	28 17	993.9	05 05	1016.5	732	26	05 11	350	13.1	12.1	9.2	10.0	11.6	11.0	13.0	13.9	12.0
45006	47.3N	090.0W	742	31	1030.0	19 10	998.8	08 12	1015.6	726	27	08 23	260	13.0	7.0	8.6	7.0	7.3	9.4	12.5	11.7	09.7
45007	42.7N	087.1W	741	31	1031.4	28 15	998.5	05 08	1019.2	727	29	05 07	270	10.4	9.5	12.1	11.5	13.4	10.9	14.4	12.8	12.1
45008	44.3N	082.4W	735	31	1032.0	28 17	994.6	08 12	1018.7	718	25	04 23	200	9.7	7.5	9.6	9.2	9.8	12.0	14.5	11.8	10.8
46001	56.3N	148.3W	743	31	1036.7	05 22	978.6	21 17	1003.4	738	32	02 01	270	12.5	15.4	14.9	13.0	11.6	15.7	17.2	17.0	16.2
46002	42.5N	130.3W	740	31	1030.1	13 10	993.3	20 11	1016.7	736	28	20 00	210	13.1	13.4	7.3	13.1	15.9	16.8	14.9	12.1	13.7
46003	51.9N	155.9W	742	31	1029.4	06 11	995.5	20 07	1012.7	740	34	18 07	320	10.1	4.3	10.0	14.3	13.7	18.9	21.0	21.3	19.1
46004	50.9N	135.9W	738	31	1030.5	03 07	979.2	22 01	1009.3	738	34	15 15	320	10.3	13.9	12.1	12.3	15.4	16.1	15.9	16.3	15.7
46005	46.1N	131.0W	351	19	1031.4	03 16	986.0	21 03	1019.1	344	38	19 15	260	17.0	10.3	8.0	7.9	9.0	14.9	14.6	15.9	14.4
46006	40.8N	137.6W	742	31	1034.7	13 16	1002.4	20 04	1023.3	739	31	20 06	320	11.7	6.8	4.7	5.7	6.0	13.0	11.9	13.1	11.9
46010	46.2N	124.2W	688	31	1030.7	03 10	990.1	22 08	1016.9	676	42	22 08	160	8.9	8.9	8.0	8.9	16.3	8.5	7.9	6.0	11.3
46011	34.9N	120.9W	743	31	1021.0	19 17	1008.0	09 12	1015.4	724	23	21 14	160	8.8	6.5	5.1	5.5	8.3	4.5	5.6	13.5	11.2
46012	37.4N	122.7W	740	31	1021.8	19 17	1005.4	21 05	1016.1	739	26	21 05	150	8.2	5.9	4.2	9.5	6.7	4.5	5.4	11.3	09.5
46013	38.2N	123.3W	742	31	1022.2	23 16	1003.5	21 04	1016.4	702	27	07 22	320	6.2	4.6	3.2	7.2	6.0	3.3	4.5	14.3	11.4
46014	39.2N	124.0W	743	31	1022.5	24 19	1001.5	21 01	1016.4	721	29	21 00	140	8.1	2.9	3.3	11.9	6.4	4.3	3.1	14.0	10.7
46016	63.3N	170.3W	238	31	1031.9	18 12	974.8	15 09	1009.6	238	29	27 06	040	10.8	12.1	9.7	9.1	10.1	11.1	10.3	10.9	10.7
46017	60.3N	172.3W	209	31	1032.6	18 06	971.4	15 08	1000.6	237	37	19 21	130	18.9	17.3	19.3	15.2	12.4	12.0	14.3	13.1	14.5
46022	40.8N	124.5W	741	31	1024.6	12 19	999.2	20 23	1017.4	738	31	22 11	160	11.2	4.5	3.4	5.6	14.3	6.9	3.3	8.7	09.8
46023	34.3N	120.7W	742	31	1021.4	19 16	1007.9	09 12	1015.1	739	27	31 10	330	11.9	4.6	4.9	8.8	7.9	5.5	6.2	15.6	13.9
46024	32.8N	119.5W	278	12	1020.0	04 18	1006.6	09 23	1013.9	274	20	08 12	300	5.7	8.3	9.0	3.3	4.1	14.0	11.8	12.8	10.5
46025	33.6N	119.0W	741	31	1019.8	19 16	1006.4	09 23	1013.3	688	16	07 00	260	8.0	4.6	4.0	4.1	4.5	4.1	7.7	6.6	06.2
46026	37.8N	122.7W	742	31	1022.7	23 18	1004.3	21 05	1016.7	709	27	21 05	190	3.0	6.6	4.2	9.2	8.1	5.5	8.2	11.6	09.1
46027	41.8N	124.4W	349	15	1024.4	31 18	1000.2	20 22	1017.5	330	41	22 09	190	14.7	4.8	6.5	10.0	12.4	10.2	4.8	8.9	11.2
46028	35.8N	121.7W	742	31	1022.3	19 16	1007.9	09 12	1016.2	736	27	31 06	320	10.2	3.3	3.7	4.6	6.5	4.2	4.4	14.1	12.1
46030	40.4N	124.5W	741	31	1024.9	12 19	1000.5	20 23	1017.4	572	33	20 19	140	11.0	5.7	3.8	15.2	7.5	3.5	3.7	6.1	10.6
46035	57.0N	177.7W	724	31	1037.6	17 22	976.2	27 11	1009.2	717	37	29 12	000	14.4	16.3	19.0	14.8	16.9	14.9	16.9	14.1	16.2
51001	23.4N	162.3W	744	31	1021.0	09 21	1007.8	19 01	1015.5	741	24	27 15	100	8.4	14.8	14.4	11.1	7.8	8.3	4.8	3.8	12.8
51002	17.2N	157.8W	743	31	1017.1	29 20	1008.1	17 01	1013.2	741	23	07 23	090	2.9	12.4	14.5	10.4	9.6	11.0			13.8
51003	19.2N	160.8W	741	31	1018.2	09 08	1008.6	17 02	1014.1	717	23	27 02	100	3.0	10.7	11.5	11.4	5.6	2.0	2.0	2.6	10.9
51004	17.5N	152.6W	741	31	1016.6	09 19	1007.7	17 02	1012.7	741	22	07 12	080	13.6	14.1	13.4	10.7					13.7
ALRF1	24.9N	080.6W	738	31	1021.7	16 14	1005.7	31 20	1015.0	735	25	20 22	070	8.7	14.8	13.6	10.9	11.9	7.5	4.3	6.6	12.4
ALSN6	40.5N	073.8W	743	31	1037.0	17 15	1005.5	05 15	1022.6	718	27	05 15	210	14.8	13.6	12.6	11.2	11.0	13.6	12.6	13.1	12.9
BURL1	28.9N	089.4W	478	22	1023.1	18 15	998.7	27 19	1016.4	559	45	28 03	110	13.8	13.8	11.4	17.2	21.1	16.1	21.2	12.5	14.1
BUZM3	41.4N	071.0W	744	31	1037.3	18 12	1004.1	05 22	1021.9	725	32	05 20	190	13.4	12.3	8.6	10.0	11.6	15.6	14.3	15.3	13.5
CARO3	43.3N	124.4W	716	31	1029.2	13 16	990.8	20 19	1018.5	686	35	22 09	200	8.7	5.9	2.7	4.5	15.0	8.9	4.1	4.6	08.8
CHLV2	36.9N	075.7W	110	07	1031.3	09 16	1010.6	31 21	1019.2	110	20	31 15	070		18.0	17.5	6.5	5.8	4.8			13.7
CLKN7	34.6N	076.5W	744	31	1031.8	18 15	1006.4	31 20	1020.1	717	31	29 02	040	9.6	15.0	13.4	6.2	8.4	9.5	5.5	7.5	12.0
CSBF1	29.7N	085.4W	700	30	1025.9	18 13	1000.4	30 11	1017.2	689	25	28 19	170	3.9	4.5	6.4	4.4	4.1	4.3	4.5	4.6	04.8
DBLN6	42.6N	079.5W	647	28	1035.3	17 15	1000.3	05 18	1020.0	640	34	06 01	260	10.0	9.2	3.9	7.4	6.9	14.0	17.0	9.7	10.0
DESW1	47.7N	124.5W	743	31	1030.7	03 17	986.4	22 00	1015.9	722	42	22 07	160	8.6	6.3	4.7	16.8	13.5	10.0	10.6	8.3	11.7
DISW3	47.1N	090.7W	743	31	1030.7	28 03	997.7	08 11	1015.7	733	35	07 23	050	12.5	11.0	8.2	7.5	9.6	14.5	16.7	17.1	12.4
DSLN7	35.2N	075.3W	744	31	1032.8	18 15	1002.7	31 11	1020.3	555	55	22 17	020	11.6	17.2	16.9	15.3	10.4	15.4	11.3	7.7	15.2
FBIS1	32.7N	079.9W	742	31	1029.9	18 15	1003.3	31 23	1019.1	720	32	29 00	080	7.4	13.6	9.2	4.6	5.9	7.6	4.9	3.5	10.1
FFIA2	57.3N	133.6W	742	31	1031.5	03 16	976.1	22 13	1005.6	682	34	04 17	100	9.5	3.9	5.1	15.7	11.9	3.3	4.5	8.0	11.9
FPSN7	33.5N	077.6W	006	01	1006.5	31 23	1006.1	31 22	1006.5	712	36	29 01	030	13.3	19.3	17.8	9.3	11.0	12.9	9.9	6.5	15.1
GDIL1	29.3N	089.9W	640	27	1023.2	18 15	998.5	27 20	1017.2	704	42	28 01	090	11.7	11.2	10.5	9.6	13.0	10.2	16.2	13.9	11.8
GLLN6	43.9N	076.4W	734	31	1035.3	17 15	1000.7	05 19	1020.1	708	34	05 22	220	7.7	6.3	5.0	12.2	16.2	16.4	14.9	10.8	12.8
IOSN3	42.9N	070.6W	744	31	1035.6	08 16	1001.9	05 22	1020.3	732	32	28 21	300	8.0	12.9	7.9	10.1	14.6	13.6	13.0	13.6	12.7
LKWF1	26.6N	080.0W	743	31	1022.4	17 16	1003.9	31 22	1015.4	738	28	27 13	140	11.7	13.4	11.9	10.2	10.7	4.1	2.8	3.4	10.4
MDRM1	44.0N	068.1W	744	31	1036.3	18 10	1001.1	06 06	1019.8	660	43	11 06	330	14.3	9.7	11.0	10.0	12.6	15.8	13.0	20.9	15.0
MISM1	43.8N	068.9W	744	31	1036.4	18 10	1001.8	06 04	1020.2	725	38	26 08	280	11.8	9.4	9.1	18.6	14.9	15.7	15.4	18.9	15.2
NWPO3	44.6N	124.1W	742	31	1029.7	13 17	996.8	22 07	1018.2	723	48	22 09	190	6.8	3.9	3.7	4.8	15.3	9.1	6.8	4.4	07.6
PILM4	48.2N	088.4W	739	31	1032.2	20 16	1000.9	08 12	1015.1	729	33	24 21	270	7.7	10.8	15.8	14.3	12.3	14.0	10.6	14.4	14.5
PTAC1	38.9N	123.7W	743	31	1022.0	23 18	1002.3	21 01	1016.2	605	26	20 22	150	9.8	3.3	3.5	7.6	6.4	1.9	2.0	8.2	07.8
PTAT2	27.8N	097.1W	725	31	1026.9	05 15	1008.4	31 23	1014.2	463	34	20 19	320	14.0	10.3	10.1	10.9	6.9	7.0	13.0	16.3	11.8
PTGC1	34.6N	120.7W	221	11	1019.7	04 17	1010.7	08 09	1014.9	461	29	31 01	340	13.6	7.1		7.3	5.8	3.3		15.1	12.7
ROAM4	47.9N	089.3W	629	30	1030.8	28 15	999.6	08 13	1014.2	638	39	08 22	240	18.1	13.7	13.8	10.8	13.6	16.2	17.1	16.1	15.5
SBIO1	41.7N	082.8W	743	31	1033.5	17 16	1003.4	05 08	1020.3	734	29	05 16	270	6.7	4.9	7.5	8.8	9.9	12.2	14.2	11.2	09.9
SGNW3	43.8N	087.7W	739	31	1032.3	28 16	994.6	05 04	1018.2	717	27	05 09	240	8.8	8.8	7.5	9.3	11.9	8.6	10.5	10.1	09.9
SISW1	48.3N	122.9W	740	31	1032.0	03 17	987.3	22 10	1016.0	730	43	22 10	160	7.6	7.6	6.3	12.3	13.5	6.6	10.0	6.5	10.4
SJLF1	30.4N	081.4W	744	31	1026.4	18 14	999.9	31 22	1017.1	720	29	29 15	030	12.4	12.3	10.9	10.7	9.3	6.2	4.8	7.1	10.8
SPGF1	26.7N	079.0W	192	08	1018.1	24 15	1005.6	31 20	1011.2	191	22	27 02	110	12.0	9.3	11.8	6.1	3.4	5.5	2.0	2.4	08.2
SRST2	29.7N	094.1W	687	30	1026.2	05 13	997.4	30 13	1016.0	686	38	28 17	340	11.7	8.2	9.8	10.4	8.1	6.1	6.2	16.2	10.6
STDM4	47.2N	087.2W	736	31	1033.0	28 16	995.5	05 05	1016.4	715	43	05 14	330	16.8	15.4	12.3	15.4	17.2	15.8	18.6	17.9	16.8
SVLS1	31.9N	080.6W	738	31	1028.1	18 14	1002.5	31 18	1018.0	726	40	29 07	040	17.0	19.2	11.7	7.0	9.9	7.8	11.1	17.8	15.8
TPLM2	38.9N	076.4W	136	07	1028.8	29 13	1015.1	31 22	1021.2	132	22	31 21	080	11.8	12.5	6.3	2.0	11.2	8.8	8.4	8.7	09.8
TTIW1	48.4N	124.7W	742	31	1031.7	03 18	984.5	22 10	1016.0	734	36	16 00	190	6.9	7.0	11.6	12.4	14.7	12.8	13.0	12.9	12.6
WPOW1	47.7N	122.4W	743	31	1031.6	04 07	992.5	22 11	1016.8	724	29	22 13	190	9.1	3.0	3.1	6.4	13.1	9.7	5.8	4.7	09.7

OCTOBER 1985			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		5.1	37.4	53.2	4.3			10.2	26.3	23.1	11.6	13.4	9.9	3.1	2.4
41002	32.3N	075.3W		5.2	28.9	60.9	5.0			3.5	22.1	26.8	10.9	18.3	12.1	4.8	2.3
41006	29.3N	077.3W		3.9	51.1	42.2	2.8			6.3	15.7	33.7	17.0	18.8	5.8	1.4	1.4
42001	25.9N	089.7W		2.2	32.7	46.4	18.4	0.3		3.8	11.6	44.2	20.1	3.7	7.0	8.7	0.9
42002	26.0N	093.5W		0.9	20.7	53.4	16.8	8.2		19.0	11.6	20.9	32.6	1.4	0.3	2.4	11.8
42003	26.0N	085.9W		1.6	19.7	58.2	19.8	0.7		3.2	14.4	50.4	13.4	6.7	9.3	1.8	0.8
42007	30.1N	088.9W		6.6	46.6	42.3	4.5			14.9	24.0	29.0	22.0	4.2	1.4	2.8	1.7
44005	42.7N	068.3W		6.1	36.2	54.3	3.4			9.9	3.5	5.5	5.8	12.1	20.7	20.3	22.3
44007	43.5N	070.1W	3.3	6.7	37.7	52.4	3.2			11.4	6.6	3.4	4.8	12.6	23.2	19.3	18.7
44008	40.5N	069.4W	4.2	9.7	48.3	40.8	1.2			11.7	15.6	14.8	6.2	11.7	12.1	15.0	13.8
44009	38.5N	074.6W	2.9	6.0	44.7	47.3	2.0			10.8	25.7	12.7	6.7	15.9	13.0	4.6	11.5
44011	41.1N	066.6W		6.3	48.6	39.6	3.5			21.3	10.6	5.1	6.2	7.4	9.6	18.5	21.4
44012	38.8N	074.6W	2.9	4.9	45.6	48.5	1.1			9.2	19.2	20.4	10.0	16.7	11.5	4.0	9.8
44013	42.4N	070.8W	3.5	6.1	45.2	48.0	0.7			3.3	7.8	3.5	7.9	13.4	24.9	17.8	21.3
45001	48.0N	087.6W	2.5	5.0	32.0	53.9	9.0	0.1		7.1	3.2	4.9	19.3	17.0	14.8	18.5	15.3
45002	45.3N	086.3W	0.9	2.2	33.3	53.9	10.6			10.7	5.4	7.0	7.8	19.9	17.3	16.7	15.2
45003	45.3N	082.8W		4.1	33.6	59.8	2.5			4.2	2.8	6.9	9.8	20.0	17.6	14.1	23.4
45004	47.2N	086.5W		2.7	38.5	56.3	2.5			6.9	3.5	5.4	13.7	23.9	11.3	15.9	19.3
45006	47.3N	090.0W	1.7	7.2	55.0	36.2	1.7			3.3	7.8	9.0	15.5	12.2	19.3	21.8	11.2
45007	42.7N	087.1W	2.3	3.7	34.7	58.7	2.9			10.2	8.6	14.6	12.9	19.8	10.3	13.8	7.7
45008	44.3N	082.4W	5.3	8.1	40.3	50.2	1.4			6.5	7.1	9.1	16.7	20.8	12.4	16.8	10.5
46001	56.3N	148.3W		2.3	17.0	60.5	20.1			2.9	1.0	1.0	6.5	5.4	12.4	38.0	32.9
46002	42.5N	130.3W		1.1	28.5	64.9	5.6			14.2	0.4	0.4	0.7	1.2	14.9	28.4	35.8
46003	51.9N	155.9W		1.9	11.6	45.3	41.1	0.1		2.6	0.9	3.9	8.9	3.9	14.5	34.6	30.7
46004	50.9N	135.9W		1.9	15.6	69.1	13.3	0.1		7.6	3.1	2.1	2.7	5.2	24.8	43.0	11.5
46005	46.1N	131.0W		3.8	26.2	56.4	12.2	1.5		4.2	6.5	4.6	8.5	2.6	21.1	33.9	18.6
46006	40.8N	137.6W		7.3	36.1	48.4	8.1			16.6	3.7	2.3	2.4	2.1	21.5	31.3	20.0
46010	46.2N	124.2W		6.5	49.4	33.4	10.2	0.4		10.9	4.2	6.1	8.0	35.7	13.2	8.4	11.5
46011	34.9N	120.9W		9.4	33.6	56.5	0.6			17.4	6.3	2.3	1.8	2.8	2.6	4.1	62.7
46012	37.4N	122.7W		13.9	45.2	38.4	2.4			15.6	1.8	1.8	7.0	7.9	5.1	4.7	56.2
46013	38.2N	123.3W		16.7	31.5	41.2	10.7			7.1	1.3	4.0	6.4	6.1	3.4	4.8	66.9
46014	39.2N	124.0W		14.1	41.3	38.0	6.5			24.6	2.6	3.1	11.2	8.7	2.2	1.3	46.4
46016	63.3N	170.3W		0.4	44.5	52.5	2.5			32.2	14.0	10.0	7.8	3.6	4.6	3.4	24.5
46017	60.3N	172.3W		3.4	29.1	51.1	16.0	0.4		19.1	10.8	8.5	10.3	9.9	9.2	7.2	25.0
46022	40.8N	124.5W		13.9	45.9	35.9	4.2			50.5	6.0	5.4	7.0	14.6	3.6	2.5	10.5
46023	34.3N	120.7W		4.2	24.9	63.1	7.8			13.2	0.7	1.6	3.2	1.8	2.0	3.9	73.6
46024	32.8N	119.5W		9.9	32.8	57.3				6.5	5.6	1.6	5.1	2.6	0.1	22.3	56.2
46025	33.6N	119.0W		27.6	56.1	16.3				5.6	3.9	7.0	5.7	6.9	10.2	42.6	18.1
46026	37.8N	122.7W		16.2	46.7	35.3	1.8			2.2	2.8	2.2	2.6	11.8	8.2	29.6	40.6
46027	41.8N	124.4W	5.6	8.9	48.8	36.4	8.6	0.9		16.3	3.8	4.2	31.1	36.2	4.6	0.6	3.7
46028	35.8N	121.7W		10.6	31.9	51.0	6.5			12.5	1.7	2.9	3.4	2.5	1.9	3.2	71.9
46030	40.4N	124.5W	7.3	7.7	44.1	43.5	4.7			54.9	6.8	1.7	14.6	11.6	1.4	1.3	7.8
46035	57.0N	177.7W		2.1	25.2	46.6	23.3	2.8		10.2	17.4	10.6	9.2	7.3	7.6	15.8	14.0
51001	23.4N	162.3W		2.6	27.7	66.5	3.2			2.1	17.1	51.7	17.4	2.4	6.1	2.2	0.9
51002	17.2N	157.8W		1.2	14.7	83.3	0.8			0.5	6.1	81.9	6.9	4.4	0.2		
51003	19.2N	160.8W		7.0	35.8	56.6	0.6			1.9	16.4	55.4	22.3	3.3	0.1	0.1	0.4
51004	17.5N	152.6W			12.0	87.9	0.1			2.9	56.0	37.1	4.0				
ALRF1	24.9N	080.6W	1.0	4.1	30.7	63.7	1.5			2.2	24.5	44.7	18.5	6.3	7.9	2.8	1.1
ALSN6	40.5N	073.8W	1.3	4.6	25.3	66.2	3.9			8.3	12.1	16.3	9.8	7.7	14.4	17.8	14.5
BURL1	28.9N	089.4W	0.7	2.5	40.3	38.6	14.7	3.9		10.7	23.5	35.3	12.3	8.6	2.5	2.2	4.7
BUZM3	41.4N	071.0W	3.9	7.2	27.0	53.1	12.7			8.6	10.1	3.8	6.7	17.2	22.2	14.0	17.3
CARO3	43.3N	124.4W	5.2	22.4	45.3	27.8	3.9	0.4		15.8	27.3	8.5	8.2	20.2	9.4	0.7	2.8
CHLV2	36.9N	075.7W		7.3	34.5	41.8	16.4				34.1	26.6	23.2	13.9	2.3		
CLKN7	34.6N	076.5W	2.2	10.2	33.3	44.2	10.3			16.2	37.5	17.2	8.6	6.4	8.0	3.1	2.9
CSBF1	29.7N	085.4W	9.1	34.1	62.0	3.8	0.1			5.9	33.2	24.0	10.3	10.6	6.8	5.4	3.7
DBLN6	42.6N	079.5W	2.0	9.4	52.0	33.6	4.8	0.2		2.9	9.6	4.8	25.9	20.1	20.3	12.1	4.2
DESW1	47.7N	124.5W	2.0	11.6	38.2	38.0	10.2	1.9		0.3	8.1	6.4	29.3	18.0	10.5	8.9	18.4
DISW3	47.1N	090.7W	1.4	5.9	39.0	44.7	[illegible]	0.3		5.2	10.5	10.4	12.1	12.0	27.6	16.9	4.5
DSLN7	35.2N	075.3W	1.0	4.0	25.4	52.4	16.4	1.4	0.2	10.7	32.0	27.8	10.0	5.2	5.2	5.0	4.1
FBIS1	32.7N	079.9W	1.8	11.3	46.7	37.8	4.3			5.7	45.4	22.2	7.3	3.6	8.6	4.3	3.1
FFIA2	57.3N	133.6W	7.9	11.6	20.7	49.7	9.8	0.1		11.8	10.7	6.3	48.9	10.1	1.7	0.3	2.2
FPSN7	33.5N	077.6W	1.5	4.1	25.1	49.9	19.4	1.5		17.3	31.6	17.5	8.6	9.3	7.9	4.1	3.7
GDIL1	29.3N	089.9W	1.0	6.0	49.0	37.8	6.3	1.0		9.2	17.8	33.7	24.7	10.0	1.5	2.2	1.0
GLLN6	43.9N	076.4W	2.9	10.7	32.8	42.8	13.6	0.1		4.5	8.5	5.3	12.9	21.1	8.4	26.7	12.5
IOSN3	42.9N	070.6W	1.1	4.4	31.7	57.8	6.1			5.4	5.9	5.2	7.4	12.0	22.8	20.8	20.5
LKWF1	26.6N	080.0W	2.0	9.8	33.4	54.7	0.1			1.8	14.6	39.4	13.0	15.1	5.0	6.6	3.6
MDRM1	44.0N	068.1W	2.4	4.8	20.3	51.2	22.7	0.9		12.8	4.5	3.3	9.8	11.8	19.3	15.5	24.5
MISM1	43.8N	068.9W		3.9	22.2	55.8	18.6	0.3		7.5	4.8	6.6	6.2	10.6	25.3	17.9	21.2
NWPO3	44.6N	124.1W	10.1	30.3	43.8	21.9	3.9	0.1		13.1	12.7	19.4	4.6	23.8	8.7	4.2	13.5
PILM4	48.2N	088.4W	0.5	5.2	25.7	52.4	16.7			4.6	2.7	7.1	18.1	20.2	16.2	19.1	12.0
PTAC1	38.9N	123.7W	7.6	21.5	47.9	29.6	1.0			45.8	8.8	3.5	12.5	17.0	2.2	0.3	9.8
PTAT2	27.8N	097.1W	0.3	1.7	40.9	53.8	3.5	0.2		15.1	13.5	17.2	33.4	1.3	1.7	3.8	13.9
PTGC1	34.6N	120.7W	3.7	8.8	31.0	52.3	8.7			63.4	6.0		2.4	6.0	1.7		20.4
ROAM4	47.9N	089.3W	0.9	5.8	21.0	53.9	19.4	0.6		6.0	5.3	4.7	17.0	14.5	21.4	19.7	11.4
SBIO1	41.7N	082.8W	2.2	12.0	43.5	40.2	3.5			2.8	9.7	19.9	12.8	14.2	17.7	16.4	6.8
SGNW3	43.8N	087.7W	3.8	11.2	46.9	39.7	2.2			5.2	10.7	10.5	10.7	25.4	9.1	17.9	10.5
SISW1	48.3N	122.9W	4.2	19.0	41.8	30.8	7.7	1.5		4.4	3.4	4.6	25.2	22.6	8.3	21.9	7.6
SJLF1	30.4N	081.4W	1.5	11.1	42.9	43.0	3.0			10.1	28.7	20.8	15.2	7.2	7.8	4.4	4.5
SPGF1	26.7N	079.0W	6.3	19.9	47.6	31.9	0.5			8.5	0.9	43.8	24.3	10.1	10.6	0.8	2.9
SRST2	29.7N	094.1W	1.0	6.0	46.5	43.3	4.2			13.3	18.3	12.0	32.0	8.9	1.6	0.4	13.5
STDM4	47.2N	087.2W	0.6	2.1	18.7	53.0	24.0	1.4		8.0	3.6	4.8	12.4	27.9	9.9	17.7	16.4
SVLS1	31.9N	080.6W	1.5	5.6	27.7	44.0	19.1	2.0		11.5	45.2	13.2	9.2	10.5	5.3	3.3	1.7
TPLM2	38.9N	076.4W	0.8	7.6	53.0	38.6	0.8			23.3	22.2	12.9	2.3	2.1	18.9	3.0	17.6
TTIW1	48.4N	124.7W	1.8	5.9	39.4	43.9	10.1	0.4		1.7	18.2	16.7	11.5	33.0	17.8	7.6	1.5
WPOW1	47.7N	122.4W	0.1	19.2	41.0	34.0	5.8			13.1	13.4	5.7	10.8	48.2	8.0	8.0	0.9

NOVEMBER 1985	AIR TEMPERATURE (DEG C)									SEA TEMPERATURE (DEG C)									AIR-SEA TEMPERATURE DIFFERENCE (DEG C)								
BUOY#	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN
41001	34.9N	072.9W	718	30	25.2	30	13	17.2	06	23	22.1	718	30	25.4	14	19	23.5	07	08	24.9	718	30	01	0128	15	07	0102	05	02.3
41002	32.3N	075.3W	313	14	25.5	02	02	19.7	01	22	23.2	313	14	26.1	11	19	24.5	09	03	25.9	313	14	00	2102	13	05	0101	22	02.0
41004	29.3N	077.3W	720	30	26.7	01	14	20.8	05	15	24.3	720	30	26.8	03	19	24.4	20	04	25.5	720	30	00	7120	04	05	3105	15	01.2
42001	25.9N	089.7W	719	30	27.1	25	21	19.6	02	12	24.3	719	30	27.6	30	19	25.0	15	08	26.2	719	30	01	3115	21	07	0129	16	01.9
42002	26.0N	093.5W	719	30	23.7	02	04	16.4	28	07	21.7	719	30	26.1	20	23	23.0	28	13	24.4	719	30	02	2126	15	05	3103	10	04.9
42003	26.0N	085.9W	734	30	28.8	02	18	23.5	05	20	26.8	715	30	27.5	07	21	24.2	24	12	25.5	719	30	03	2120	03	03	3106	20	01.3
42007	30.1N	088.4W	623	30	29.9	14	16	13.7	06	14	20.6	623	30	22.6	16	19	17.8	06	15	20.7	623	30	03	1116	16	06	0122	10	00.1
44005	42.7N	068.4W	717	30	14.2	10	16	00.2	24	10	07.9	717	30	11.1	01	02	09.2	30	13	10.2	716	30	03	3110	16	09	7126	10	02.3
44007	43.5N	070.1W	616	29	14.4	21	03	01.6	06	08	09.4	616	29	11.3	01	17	08.1	27	09	09.4	621	29	03	4121	03	11	9126	09	00.0
44008	40.5N	069.5W	719	30	17.1	15	02	04.6	10	11	11.1	719	30	13.7	01	17	08.1	27	09	10.7	720	30	04	3115	05	10	9126	10	01.4
44009	38.5N	074.6W	716	30	18.7	15	07	07.1	25	14	14.1	716	30	16.5	01	13	13.6	30	16	15.2	719	30	02	2115	07	07	3125	16	01.1
44011	41.1N	066.6W	719	30	16.4	05	17	02.3	26	23	10.3	240	30	14.7	03	16	05.3	10	16	12.1	719	30	09	0110	16	08	7126	23	01.8
44013	38.8N	074.6W	695	30	19.5	14	14	06.6	28	13	13.7	678	30	16.4	01	15	12.9	30	19	14.8	697	30	04	4114	14	07	4125	13	01.2
44014	36.6N	074.8W	719	30	17.7	29	22	02.4	26	11	07.6	718	30	11.5	01	20	08.4	30	11	10.0	719	30	06	7120	22	11	7126	11	02.4
45011	48.0N	087.6W	684	30	07.5	01	03	13.6	29	17	01.7	687	30	06.2	01	02	04.0	30	03	05.3	714	30	01	3101	03	17	0127	17	04.4
45020	45.3N	086.3W	329	14	13.2	05	22	01.0	11	07	05.3	327	14	12.0	04	06	09.2	12	06	11.0	330	14	01	4101	22	11	6110	16	04.0
45033	45.3N	082.6W	719	30	12.4	02	00	03.6	11	23	03.7	719	30	10.8	01	05	05.7	28	04	08.0	719	30	06	7120	04	12	3111	12	04.3
45004	47.2N	086.5W	312	14	09.7	01	19	05.9	10	17	02.5	312	14	07.6	01	01	06.1	16	03	07.0	313	14	02	1101	19	12	4110	17	04.5
45006	47.3N	090.0W	335	14	07.0	01	04	11.0	14	01	01.5	335	14	06.2	06	05	11.1	07	05	05.5	335	14	01	6101	01	11	4110	13	04.0
45007	42.7N	087.1W	720	30	12.6	01	15	05.1	24	10	04.8	720	30	11.7	01	05	08.0	08	04	09.8	720	30	03	7119	04	12	1124	10	04.0
45008	44.3N	082.4W	720	30	12.6	01	23	02.9	21	16	04.4	720	30	10.1	04	03	04.2	30	22	07.9	720	30	05	0120	07	10	0121	16	03.4
46001	56.3N	148.3W	720	30	08.9	05	04	05.0	03	10	04.1	720	30	07.0	06	02	05.6	27	11	06.3	720	30	00	3127	10	11	6103	10	02.1
46002	42.8N	130.3W	718	30	15.8	02	17	01.0	10	11	07.6	718	30	13.1	03	11	02.2	27	14	10.1	718	30	01	1115	07	07	0110	11	02.5
46003	51.9N	155.7W	719	30	09.2	09	13	01.2	02	11	06.6	719	30	07.6	01	03	04.6	13	17	07.1	719	30	02	1109	13	06	3103	04	00.5
46004	50.9N	135.9W	719	30	11.1	03	01	02.7	02	06	05.3																		
46006	40.8N	137.4W	719	30	16.7	02	00	10.4	16	13	11.7	719	30	14.0	01	23	10.2	30	16	13.2	719	30	01	0119	08	05	0110	16	01.5
46011	34.9N	120.9W	720	30	17.7	06	21	07.5	12	06	12.6	720	30	16.4	07	19	12.5	26	04	14.2	720	30	03	5106	10	07	5112	16	01.6
46012	37.4N	122.7W	717	30	18.8	15	23	08.3	11	17	13.4	717	30	12.9	01	21	11.0	21	09	11.8	717	30	02	2115	23	03	7111	17	00.2
46013	38.2N	123.3W	715	30	12.4	01	22	04.7	13	01	09.0	713	30	11.7	10	18	09.8	13	10	10.4	715	30	02	1101	22	04	8111	11	00.5
46014	39.2N	124.0W	719	30	12.5	01	01	04.8	12	16	09.6	719	30	12.3	27	10	09.4	13	12	10.9	719	30	02	1103	01	08	2114	16	01.1
46016	63.3N	170.3W	227	30	01.3	10	03	-14.6	03	18	-03.7																		
46017	60.3N	172.3W	218	30	05.2	17	12	-06.2	12	03	01.1																		
46022	40.8N	124.5W	719	30	12.3	02	00	04.9	10	09	09.2	719	30	11.3	04	21	08.9	12	17	10.1	719	30	02	0115	06	05	2110	09	00.9
46023	34.3N	120.7W	718	30	19.2	02	22	08.2	11	09	13.3	718	30	17.2	02	23	12.1	21	00	14.7	719	30	01	4102	21	07	7112	09	01.4
46025	33.8N	119.0W	720	30	21.1	02	22	11.0	12	01	15.1	720	30	20.3	03	05	14.9	30	04	16.9	720	30	01	6102	21	06	6112	01	01.8
46026	37.8N	122.7W	711	30	15.4	02	19	05.9	11	15	10.3	711	30	13.3	04	07	10.5	21	15	11.4	712	30	02	4102	19	04	3111	15	01.1
46027	41.8N	124.4W	717	30	12.0	02	21	04.7	12	15	08.2	717	30	11.3	02	00	08.4	26	11	09.7	716	30	02	2107	19	05	8110	03	01.5
46028	35.8N	121.9W	717	30	19.4	10	14	08.9	11	21	12.8	717	30	15.8	03	11	11.7	23	01	13.4	717	30	01	6102	18	04	9111	21	00.8
46030	40.4N	124.5W	720	30	11.7	01	23	03.8	10	01	08.7	720	30	11.4	02	01	09.5	13	07	10.4	720	30	01	0109	23	06	1110	16	01.7
46035	57.0N	177.7W	720	30	06.5	17	04	-00.2	06	02	03.7	720	30	05.2	06	23	04.4	26	14	04.7	720	30	01	0117	04	05	3106	02	01.1
51001	23.4N	162.1W	719	30	29.7	02	03	24.6	13	16	27.1	719	30	26.8	02	21	25.2	30	14	25.8	720	30	00	1119	02	03	7111	10	01.5
51002	17.2N	157.8W	717	30	26.7	19	23	22.1	27	17	25.1	717	30	28.0	20	01	25.9	11	09	26.5	717	30	00	2116	19	04	3127	17	01.4
51003	19.2N	160.5W	719	30	27.1	17	03	21.9	07	23	25.3	719	30	27.5	18	00	26.2	30	11	26.8	719	30	00	1119	03	04	8107	23	01.4
51004	17.5N	152.5W	717	30	26.9	15	03	21.5	27	17	25.1	717	30	27.8	05	01	25.9	16	09	26.4	717	30	00	6119	02	05	2127	17	01.1
ALRF1	29.9N	080.6W	716	30	28.9	03	19	19.4	05	18	25.1	716	30	29.5	03	21	24.6	04	12	26.1	717	30	01	3119	13	07	1104	09	01.0
ALSM1	40.5N	073.8W	718	30	23.0	20	19	02.3	11	21	10.3																		
BUML1	28.9N	089.4W	720	30	24.2	12	19	14.1	04	19	20.8																		
BUZM3	41.4N	071.0W	720	30	16.4	16	15	00.3	26	13	09.0																		
CAR03	43.3N	124.4W	621	30	15.4	03	16	02.5	11	05	07.7																		
CHLV2	36.9N	075.7W	719	30	23.6	27	23	08.9	11	13	16.1	712	30	19.1	01	15	15.2	27	01	16.9	718	30	07	7127	22	07	8123	13	00.7
CLKN7	34.6N	076.5W	710	30	23.6	21	19	09.3	23	13	18.7																		
CSBF1	29.7N	085.4W	512	24	26.7	19	20	11.7	06	21	21.3																		
DBLN4	42.6N	079.4W	704	30	21.1	20	00	01.2	12	04	06.9																		
DESW1	47.7N	124.5W	700	30	11.7	01	19	04.1	22	07	08.4																		
DISW3	47.1N	090.7W	717	30	07.5	01	05	13.3	29	10	01.6																		
DSLN7	39.2N	075.3W	719	30	28.9	01	23	13.3	24	12	20.6																		
FBIS1	32.7N	079.9W	720	30	23.7	20	18	07.7	05	12	19.0																		
FFIA2	57.3N	133.6W	695	30	05.9	01	20	-11.3	26	22	-00.9																		
FPSN7	33.5N	077.6W	720	30	24.8	01	14	13.5	23	14	21.3																		
GDIL1	29.3N	089.9W	659	29	24.9	27	19	14.5	22	17	21.3	688	29	25.0	16	22	18.2	04	03	22.1	660	29	03	5107	16	07	4122	12	00.9
GLLN6	43.9N	076.4W	718	30	14.6	01	19	04.1	26	07	04.7																		
IRSN3	42.9N	070.6W	716	30	21.1	20	00	02.3	26	11	08.4																		
LRWF1	26.6N	080.0W	711	30	29.7	01	19	19.9	05	12	24.6	711	30	27.6	03	22	24.7	16	10	25.8	715	30	02	4101	19	11	7105	12	01.3
MDBM1	44.0N	064.1W	719	30	12.8	23	03	-04.1	26	03	05.6																		
MISW1	43.0N	069.6W	719	30	13.1	21	04	-02.1	26	10	05.7																		
NWPO3	44.6N	124.1W	488	26	13.1	03	21	02.5	13	08	07.8																		
PILM1	48.2N	088.6W	571	29	08.1	01	04	-16.1	29	15	-02.3																		
PTAC1	38.9N	123.7W	696	30	12.3	16	19	03.2	11	05	08.9																		
PTAT2	27.8N	097.1W	719	30	24.8	01	16	11.3	21	09	18.3																		
PTGC1	34.6N	120.7W	697	30	21.3	02	20	07.0	12	13	12.6																		
RDAM4	47.9N	089.3W	719	30	07.6	01	04	-16.5	29	10	-02.0																		
SBIO1	41.7N	082.8W	720	30	19.0	20	04	00.6	12	05	07.2																		
SGNW3	43.8N	087.7W	719	30	13.6	19	12	-12.9	24	11	02.0	716	30	10.9	01	22	00.7	29	10	04.1	719	30	05	4119	12	16	0124	09	04.1
SISW1	48.3N	122.9W	633	30	12.3	02	04	-08.2	12	06	03.1																		
SJLF1	30.4N	081.4W	719	30	27.9	30	19	08.5	06	12	21.4																		
SPGF1	26.7N	079.0W	719	30	28.5	01	17	19.4	07	10	24.6	718	30	28.5	02	19	24.6	06	09	26.3	720	30	01	7120	19	05	8105	17	01.7
SRST2	29.7N	094.1W	580	25	24.0	19	20	08.5	21	13	19.8																		
STDM4	41.2N	087.2W	674	29	09.8	01	19	-07.9	27	11	00.2																		
SVLS1	31.9N	080.7W	718	30	24.6	01	04	09.3	05	12	19.9	717	30	21.9	02	15	17.1	09	10	20.0	719	30	05	4122	11	11	6101	12	00.1
TPLM2	28.4N	096.4W	672	30	23.0	13	21	04.2	22	11	11.7	667	30	18.9	02	19	10.1	26	04	13.3	705	30	04	2113	21	07	8122	11	01.4
TTIS1	49.1N	123.7W	698	30	11.4	01	22	04.1	22	04	03.8																		
WPOW1	47.7N	122.4W	666	30	12.6	02	07	-04.1	25	08	03.9																		

NOVEMBER 1985	WAVE HEIGHTS (METERS)					FREQUENCY OF WAVE HEIGHTS (%)						
BUOY#	LAT	LONG	OBS	MAX	DY	HR	MEAN	CLM	1-1.5M	2-2.5M	3-3.5M	4-4.5M	5-6.5M	6-7.5M	8-9.5M	>9.5M
41002	32.3N	075.3W	313	5.0	05	12	2.2		27.4	55.9	12.1	4.4				
41004	29.3N	077.3W	717	5.0	19	06	1.9		35.2	51.3	10.6	2.7				
42001	25.9N	089.7W	692	6.5	21	19	1.4	15.4	64.0	12.4	2.6	0.1				
42002	26.0N	093.5W	717	5.5	02	11	1.2	24.5	61.2	9.3	4.8					
42003	26.0N	085.9W	671	10.5	20	17	1.4	16.3	64.5	9.8	3.1	4.0	1.0	0.2	0.2	
42007	30.1N	088.4W	523	5.0	21	16	0.6	62.7	13.9	2.8	0.3					
44005	42.7N	068.4W	715	8.0	15	14	2.0	1.6	35.0	46.8	13.0	2.5				
44007	43.5N	070.1W	586	6.5	17	18	1.0	34.1	58.5	6.1	1.1					
44008	40.5N	069.5W	280	4.0	26	22	1.6	0.7	59.2	34.2	5.4	0.3				
44011	41.1N	066.6W	717	6.0	06	04	2.3		28.4	48.0	24.9	6.1	0.4			
44013	42.4N	070.8W	123	8.0	00	00	0.0									98.2
45011	48.0N	087.6W	471	4.0	19	05	1.3	27.2	47.3	20.4	4.4	0.4				
45020	45.3N	086.3W	309	2.5	10	19	1.0	28.1	64.7	7.1						
45033	45.3N	082.6W	702	3.5	16	17	1.4	15.2	58.4	25.7	3.5					
45004	47.2N	086.5W	302	3.0	06	07	1.1	8.2	71.5	18.8	1.3					
45006	47.3N	090.0W	328	2.0	03	04	0.9	42.1	55.9	1.8						
45008	44.3N	082.4W	716	4.0	20	10	1.3	18.7	58.1	22.0	2.7	0.2				
46001	56.3N	148.3W	719	7.0	27	05	1.3	1.1	80.0	14.6	3.2	1.1	2.9			
46002	42.5N	130.3W	717	7.5	10	15	2.9		11.1	39.3	31.2	14.3	3.9			
46003	51.9N	155.7W	717	10.0	24	12	4.0		6.9	12.8	25.5	38.2	13.9	2.3	0.4	
46004	50.9N	135.9W	717	7.0	27	05	2.9		19.3	27.6	30.6	23.5	1.8			
46006	40.8N	137.4W	718	12.0	29	09	2.9		0.8	40.1	21.7	13.5	2.3	1.1	0.2	
46011	34.9N	120.9W	719	5.0	30	19	1.9	0.5	49.5	38.3	9.6	1.6				
46012	37.4N	122.7W	715	5.5	30	06	2.1	0.4	42.9	41.0	10.2	3.4				
46013	38.2N	123.3W	698	5.5	30	06	2.1	1.5	36.3	41.0	17.2	3.7				
46014	39.2N	124.0W	718	5.5	30	06	2.3	0.2	27.7	43.5	23.2	5.1				
46022	40.8N	124.5W	715	5.5	30	09	2.3		25.0	43.2	23.3	8.5				
46023	34.3N	120.7W	038	3.5	01	00	1.0			28.4	71.3					
46025	33.8N	119.0W	718	5.0	17	05	1.3	9.1	46.5	22.1	2.0					
46026	37.8N	122.7W	703	5.0	30	07	1.5	4.9	61.7	29.0	3.9	0.8				
46027	41.8N	124.4W	715	5.0	10	10	2.1		33.7	47.2	10.3	5.7				
46028	35.8N	121.9W	717	5.5	30	16	2.2	0.2	33.6	38.2	23.8	4.0				
46035	57.0N	177.7W	719	9.5	04	02	3.7		10.1	18.9	27.8	31.4	10.4	1.2		
51001	23.4N	162.1W	719	6.5	19	17	2.9		0.3	46.7	28.6	17.2	6.8			
51002	17.2N	157.8W	715	4.0	20	16	2.0		24.6	44.5	8.1	0.6				
51003	19.2N	160.5W	719	5.0	20	20	2.4		11.5	42.7	17.6	6.1				
51004	17.5N	152.5W	717	4.0	16	09	2.3		5.8	74.0	18.6	1.3				
CHLV2	36.9N	075.7W	708	4.0	04	23	1.3	30.7	55.9	10.7	3.3	0.1				

NOVEMBER 1985			PRESSURE (MB)									WIND SPEEDS (KNOTS)					MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY	HR	MIN	DY	HR	MEAN	OBS	MAX	DY	HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	718	30	1031.9	19	14	1001.6	05	11	1019.9	717	33	04	23	140	12.1	13.0	16.2	15.1	11.7	14.3	15.6	16.9	13.3
41002	32.3N	075.3W	313	14	1030.5	09	15	1003.6	02	09	1016.7	313	27	05	06	200	14.3	11.7	13.5	12.9	11.9	17.0	14.6	14.1	14.2
41006	29.3N	077.3W	720	30	1026.2	09	15	1005.2	01	22	1019.3	718	22	19	03	070	10.1	11.6	11.9	11.7	11.6	10.7	11.9	10.2	11.5
42001	25.9N	089.7W	717	30	1022.1	08	16	999.2	01	00	1015.9	705	29	02	11	190	16.0	8.0	10.9	12.8	11.7	7.0	10.9	14.3	12.1
42002	26.0N	093.5W	710	30	1022.3	04	16	999.3	02	03	1015.9	710	30	02	02	180	15.6	12.3	11.8	15.0	13.4	11.2	11.8	11.9	14.2
42003	26.0N	085.9W	704	30	1022.9	09	15	999.3	21	00	1016.0	714	92	20	17	040	16.0	19.5	13.3	15.0	14.3	27.3	17.4	14.3	15.4
42007	30.1N	088.9W	623	30	1024.6	08	16	1003.2	01	19	1018.2	602	28	21	11	030	13.6	12.2	7.7	8.8	9.7	9.8	13.1	12.1	09.7
44005	42.7N	068.4W	717	30	1030.1	16	15	1000.0	06	18	1020.6	713	29	15	10	320	12.5	12.6	12.7	11.1	13.8	12.6	13.4	13.0	13.1
44007	43.5N	070.1W	616	29	1039.2	16	13	999.9	06	19	1021.5	586	27	15	11	340	12.5	11.6	7.7	13.4	10.3	10.8	11.9	12.6	11.6
44008	40.5N	069.5W	719	30	1035.9	16	15	998.7	06	19	1019.4	702	29	15	13	330	14.9	16.8	17.8	16.3	11.1	11.6	13.0	11.9	14.5
44009	38.5N	074.6W	718	30	1032.7	10	16	998.0	05	10	1020.1	690	43	05	00	090	12.6	17.8	14.2	8.8	12.4	11.6	12.9	14.0	13.9
44011	41.1N	066.6W	719	30	1036.6	16	22	1001.1	06	20	1020.1	719	27	15	12	320	13.9	14.4	12.6	13.5	11.5	10.9	12.0	11.0	13.2
44012	38.8N	074.6W	683	30	1032.8	16	07	998.2	05	10	1020.6	670	37	05	02	110	14.3	17.4	17.8	9.5	13.1	10.7	10.8	13.1	14.3
44013	42.4N	070.8W	718	30	1038.7	16	14	999.6	06	18	1021.1	702	29	15	09	310	11.9	15.4	14.8	13.3	10.8	11.4	12.3	11.9	12.7
45001	48.0N	087.6W	689	30	1039.7	11	15	995.9	20	07	1019.6	076	25	03	00	010	17.2	9.4	14.8	14.3	5.0		4.0	16.9	14.2
45002	45.3N	086.3W	329	14	1037.4	11	14	1001.9	02	12	1016.6														
45003	45.3N	082.8W	719	30	1037.3	11	15	997.6	20	07	1018.5	718	28	20	09	250	9.0	12.2	12.5	15.4	14.4	12.9	15.6	12.7	13.2
45004	47.2N	086.5W	312	14	1039.5	11	15	1003.4	07	20	1017.5	310	22	08	02	280	14.9	11.3	8.9	11.9	10.1	12.8	12.0	[illegible]	12.8
45006	47.3N	090.0W	335	14	1037.2	11	08	1002.1	01	18	1018.7	325	21	07	23	280	11.9	11.3	7.5	10.9	9.1	7.4	10.7	[illegible]	10.3
45007	42.7N	087.1W	720	30	1035.8	21	14	999.3	02	09	1018.7	698	31	20	04	240	13.3	13.8	15.8	13.4	10.4	12.7	10.2	12.6	13.0
45008	44.3N	082.4W	720	30	1035.1	15	17	[illegible]	[illegible]	12	1018.3	711	33	20	09	240	11.1	14.0	15.1	13.9	9.9	16.0	14.3	11.0	13.0
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

NOVEMBER 1985			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	1-3KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

DECEMBER 1985			AIR TEMPERATURE (DEG C)							SEA TEMPERATURE (DEG C)							AIR-SEA TEMPERATURE DIFFERENCE (DEG C)						
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN
41001	34.9N	072.9W	742	31	25.1	02 17	04.8	26 20	16.6	742	31	24.8	08 18	21.7	31 00	23.4	742	31	00.9	02 13	-18.0	26 20	-06.8
41006	29.3N	077.3W	744	31	25.6	02 19	11.0	26 12	20.3	744	31	25.5	11 02	22.7	31 03	24.4	744	31	00.5	02 19	-12.5	26 18	-04.1
42001	25.9N	089.7W	538	23	27.1	01 21	12.9	26 13	20.8	538	23	27.9	01 20	23.5	20 07	25.4	538	23	-00.7	13 15	-12.0	14 22	-04.7
42002	26.0N	093.5W	742	31	23.4	01 19	10.6	14 21	17.9	742	31	27.5	01 22	21.8	26 14	24.0	742	31	-02.7	11 15	-12.5	14 18	-06.1
42003	26.0N	085.9W	735	31	27.9	13 23	17.7	26 14	23.9	741	31	25.6	02 20	21.4	26 13	23.3	744	31	03.6	29 12	-04.2	26 18	00.6
42007	30.1N	088.9W	554	28	23.2	01 15	-01.5	26 10	12.5	552	25	21.5	01 21	10.9	26 13	16.8	555	28	03.3	26 07	-15.8	03 12	-04.3
44004	38.5N	070.7W	273	12	17.2	25 04	01.0	26 09	09.1	273	12	18.3	22 09	15.8	29 22	16.6	273	12	00.4	25 04	-16.2	22 11	-07.5
44005	42.7N	068.4W	744	31	12.5	02 11	-08.6	19 12	02.6	744	31	09.3	02 17	07.0	30 23	08.0	744	31	03.3	02 11	-16.5	19 12	-05.3
44007	43.5N	070.1W	741	31	11.6	02 12	-15.0	19 11	-00.6	738	31	08.6	01 04	05.0	27 05	07.0	742	31	03.0	02 12	-22.0	19 11	-07.6
44008	40.5N	069.5W	742	31	15.6	02 16	-04.5	19 14	05.2	740	31	12.0	02 06	06.7	29 18	09.6	742	31	04.9	25 11	-13.5	19 13	-04.4
44009	38.5N	074.6W	292	13	15.0	02 17	-00.2	03 05	07.8	292	13	13.6	01 01	10.5	12 06	12.3	292	13	03.3	12 19	-13.3	03 05	-04.5
44011	41.1N	066.6W	741	31	17.2	02 13	-03.1	19 13	08.6	740	31	13.7	02 12	04.8	21 13	08.2	742	31	04.8	14 07	-10.1	19 13	-02.6
44012	38.8N	074.6W	729	31	14.5	02 16	-08.0	26 14	04.4	724	31	12.9	01 01	05.8	26 21	09.6	738	31	02.6	25 06	-15.1	19 08	-05.2
44013	42.4N	070.8W	744	31	13.9	02 13	-11.5	19 13	00.3	744	31	08.6	01 03	04.2	31 16	06.6	744	31	05.9	02 13	-17.3	19 13	-06.3
45001	48.0N	087.6W	743	31	01.0	06 02	-19.9	18 00	-08.4	743	31	04.2	01 03	02.8	31 23	03.6	743	31	-02.4	30 23	-23.6	18 00	-12.1
45003	45.3N	082.8W	076	04	07.2	02 04	-06.4	02 18	-02.0	076	04	05.7	01 01	05.3	02 20	05.5	077	04	01.6	02 04	-13.8	02 19	-07.5
45007	42.7N	087.1W	472	20	07.8	01 21	-14.0	18 13	-03.0	472	20	06.3	01 09	04.1	20 15	04.8	472	20	02.0	01 21	-18.7	18 13	-07.8
45008	44.3N	082.4W	068	03	08.5	02 02	-04.3	02 17	01.3	068	03	06.3	01 01	05.8	02 22	06.0	069	03	02.3	02 02	-10.2	02 17	-04.8
46001	56.3N	148.3W	742	31	07.9	23 02	01.5	06 06	05.3	742	31	05.7	01 01	05.3	03 12	05.5	742	31	02.5	23 02	-03.8	06 06	-00.2
46002	42.5N	130.3W	741	31	13.9	04 04	07.0	22 23	10.7	741	31	12.3	01 17	10.1	20 16	11.0	741	31	02.0	20 19	-03.4	31 05	-00.3
46003	51.9N	155.7W	742	31	08.4	08 10	01.3	04 13	05.6	742	31	06.6	01 01	05.7	20 00	06.0	742	31	02.3	26 00	-05.0	04 13	-00.4
46004	50.9N	135.9W	743	31	09.8	04 05	02.2	01 00	07.3														
46006	40.8N	137.6W	743	31	15.6	03 17	09.9	07 03	13.6	743	31	14.2	01 01	13.2	23 20	13.6	743	31	01.7	03 17	-03.7	07 03	00.0
46010	46.2N	124.2W	501	22	10.9	15 23	02.3	11 14	05.8	503	22	08.8	19 13	05.7	18 04	07.7	504	22	03.1	15 23	-05.5	11 11	-02.0
46011	34.9N	120.9W	743	31	18.2	25 23	07.7	12 13	12.7	743	31	14.6	25 23	12.6	12 06	13.5	743	31	03.6	25 23	-05.3	12 13	-00.8
46012	37.4N	122.7W	738	31	17.8	25 02	08.4	11 16	12.7	738	31	12.8	07 05	11.5	02 08	12.1	738	31	06.0	25 02	-03.6	11 16	00.6
46013	38.2N	123.3W	730	31	13.3	02 19	05.5	27 17	09.5	730	31	11.8	07 18	10.2	01 06	11.2	730	31	02.2	02 19	-05.6	23 16	-01.6
46014	39.2N	124.0W	744	31	14.1	17 23	06.3	12 14	09.7	744	31	13.2	20 21	10.2	03 12	11.8	744	31	02.6	17 23	-06.2	12 11	-02.1
46016	63.3N	170.3W	246	31	01.6	27 09	-18.0	06 09	-05.6														
46017	60.3N	172.3W	087	11	07.3	11 21	-07.7	06 06	-00.1														
46022	40.8N	124.5W	741	31	13.9	02 12	06.2	25 04	09.3	741	31	11.2	07 00	09.4	20 16	10.5	741	31	03.8	02 08	-04.2	25 04	-01.2
46023	34.3N	120.7W	743	31	17.2	26 16	09.7	11 15	13.1	743	31	15.2	21 23	12.8	17 16	13.6	743	31	03.6	26 16	-03.5	11 15	-00.5
46025	33.6N	119.0W	376	16	16.2	08 00	09.8	11 06	13.7	376	16	15.6	05 22	14.1	12 15	14.9	377	16	00.8	08 00	-04.8	11 06	-01.2
46026	37.8N	122.7W	739	31	14.4	18 00	04.7	28 16	09.8	739	31	12.2	31 23	10.4	24 23	11.1	743	31	03.6	18 00	-07.1	28 17	-01.3
46027	41.8N	124.4W	741	31	12.8	17 19	05.1	19 10	08.5	742	31	10.5	31 00	08.8	22 11	09.4	742	31	03.8	17 19	-04.2	19 10	-00.9
46028	35.8N	121.9W	741	31	16.0	17 18	09.4	27 11	12.7	741	31	13.8	27 02	12.5	12 10	13.0	741	31	02.8	17 18	-03.5	27 11	-00.4
46030	40.4N	124.5W	743	31	12.5	05 05	05.5	23 17	09.0	744	31	12.7	30 18	10.3	01 05	11.3	744	31	01.4	02 08	-05.6	19 03	-02.3
46035	57.0N	177.7W	742	31	04.8	26 08	-01.7	20 00	02.6	744	31	04.7	01 19	04.0	26 23	04.4	744	31	00.6	26 08	-06.0	20 00	-01.8
51001	23.4N	162.3W	744	31	25.2	05 03	19.3	25 16	22.4	744	31	24.5	06 23	22.6	27 09	23.7	744	31	00.9	05 03	-04.2	24 17	-01.3
51002	17.2N	157.8W	744	31	26.1	23 03	21.7	25 16	24.6	744	31	26.8	24 02	25.4	29 07	26.0	744	31	-00.1	23 03	-04.3	25 16	-01.4
51003	19.2N	160.8W	744	31	26.6	08 03	22.1	16 06	24.5	744	31	27.0	09 03	24.7	31 14	25.8	744	31	00.2	08 03	-03.8	16 06	-01.3
51004	17.5N	152.5W	742	31	26.3	09 02	22.3	31 13	25.0	742	31	27.2	16 02	25.7	17 13	26.4	742	31	00.1	22 02	-03.7	25 21	-01.3
51005	20.3N	156.1W	525	23	26.5	23 21	21.1	16 10	23.5	525	23	26.0	23 22	24.2	26 11	24.9	530	23	01.0	23 20	-03.9	16 10	-01.4
ALRF1	24.9N	080.6W	741	31	26.5	01 18	07.5	26 14	20.3	741	31	25.9	02 20	20.1	27 08	23.9	741	31	01.3	28 17	-14.3	26 13	-03.6
ALSN6	40.5N	073.8W	741	31	13.0	02 06	-09.3	26 13	01.8														
BURL1	28.9N	089.4W	704	31	23.2	01 20	04.7	14 12	13.0														
BUZM3	41.4N	071.0W	742	31	14.6	02 09	-07.8	26 08	02.1														
CARO3	43.3N	124.4W	743	31	10.4	24 21	01.2	10 11	07.7														
CHLV2	36.9N	075.7W	730	31	17.4	12 20	-06.9	26 14	06.5	728	31	15.6	01 01	06.8	29 10	11.0	743	31	04.9	11 20	-15.6	26 14	-04.6
CLKN7	34.6N	076.5W	661	31	20.3	02 20	-04.1	26 08	09.5														
CSBF1	29.7N	085.4W	655	30	24.4	01 16	04.8	15 00	13.8														
DBLN6	42.6N	079.4W	501	22	12.8	02 04	-11.6	19 06	-01.7														
DESW1	47.7N	124.5W	727	31	12.2	04 22	-03.7	01 16	05.0														
DISW3	47.1N	090.7W	743	31	00.2	31 01	-18.6	13 12	-09.8														
DSLN7	35.2N	075.3W	742	31	21.5	02 11	-05.0	26 15	10.6														
FBIS1	32.7N	079.9W	734	31	20.5	02 07	-04.4	26 07	09.8														
FFIA2	57.3N	133.6W	739	31	13.5	20 10	-04.4	02 14	03.3														
FPSN7	33.5N	077.6W	741	31	23.6	02 08	-03.9	26 13	12.5														
GDIL1	29.3N	089.9W	685	31	25.2	01 17	04.7	14 10	13.1	322	16	23.4	01 21	14.4	06 15	17.1	734	31	05.2	31 17	-11.7	02 12	-03.0
GLLN6	43.9N	076.4W	743	31	08.4	02 09	-13.7	19 08	-02.3														
IOSN3	42.9N	070.6W	743	31	11.6	02 17	-14.7	19 13	-00.7														
LKWF1	26.6N	080.0W	737	31	27.3	13 20	05.8	26 08	19.4	743	31	25.6	02 00	20.8	26 17	23.8	744	31	02.6	13 20	-16.6	26 08	-04.5
MDRM1	44.0N	068.1W	744	31	11.2	02 14	-14.6	19 12	-00.4														
MISM1	43.8N	068.9W	742	31	11.9	02 13	-15.2	19 11	-00.4														
NWPO3	44.6N	124.1W	715	31	15.6	24 21	-00.8	02 05	06.6														
PTAC1	38.9N	123.7W	740	31	13.1	19 20	01.4	12 14	08.4														
PTAT2	27.8N	097.1W	740	31	22.8	01 07	-00.6	14 13	13.2														
PTGC1	34.6N	120.7W	720	31	22.6	26 08	05.9	11 13	13.3														
ROAM4	47.9N	089.3W	475	20	00.2	04 15	-20.8	17 22	-09.1														
SBIO1	41.7N	082.8W	553	26	12.5	01 23	-16.9	26 12	-04.4														
SGNW3	43.8N	087.7W	742	31	03.1	01 04	-22.2	18 10	-09.1	692	31	03.4	08 02	00.0	03 11	00.5	744	31	02.8	31 02	-22.2	18 10	-09.6
SISW1	48.3N	122.9W	741	31	11.0	04 21	-05.3	01 16	04.1														
SJLF1	30.4N	081.4W	744	31	26.4	12 19	-05.3	26 12	12.2														
SPGF1	26.7N	079.0W	688	31	26.6	01 20	11.2	26 16	21.1	694	31	26.9	01 19	19.7	23 15	24.2	709	31	01.4	14 15	-09.9	26 14	-03.1
SRST2	29.7N	094.1W	727	31	22.1	01 07	-00.5	26 05	11.0														
SVLS1	31.9N	080.7W	741	31	21.9	02 01	-05.4	26 12	11.3	740	31	20.7	01 01	11.4	28 19	16.1	743	31	03.4	11 15	-18.5	26 12	-04.7
TPLM2	38.9N	076.4W	743	31	16.2	12 16	-11.1	26 13	02.6	743	31	12.7	02 17	01.3	22 09	06.0	743	31	07.6	12 16	-12.9	26 13	-03.4
TTIW1	48.4N	124.7W	742	31	12.8	04 22	-02.4	01 17	05.3														
WPOW1	47.7N	122.4W	743	31	09.6	04 22	-05.9	01 16	04.0														

DECEMBER 1985			WAVE HEIGHTS (METERS)				FREQUENCY OF WAVE HEIGHTS (%)							
BUOY	LAT	LONG	OBS	MAX	DY HR	MEAN	<1M	1-1.5M	2-2.5M	3-3.5M	4-5.5M	6-7.5M	8-9.5M	>9.5M
41006	29.3N	077.3W	742	4.5	14 20	1.6		64.4	25.2	8.4	1.8			
42001	25.9N	089.7W	536	4.0	14 14	1.2	33.2	45.5	14.3	5.9	0.9			
42002	26.0N	093.5W	739	4.0	14 07	1.3	14.8	60.2	20.8	3.6	0.4			
42003	26.0N	085.9W	722	4.5	14 17	1.1	27.7	57.0	10.6	3.4	1.1			
42007	30.1N	088.9W	437	1.5	02 07	0.6	66.8	33.1						
44004	38.5N	070.7W	271	5.5	27 23	2.7	1.8	16.6	26.5	38.7	16.2			
44005	42.7N	068.4W	743	6.0	03 06	2.0	7.6	36.3	33.1	14.8	7.4	0.6		
44007	43.5N	070.1W	648	3.5	02 11	1.0	32.8	55.8	10.0	1.2				
44008	40.5N	069.5W	742	6.5	03 03	2.1	4.9	30.5	39.0	18.0	6.7	0.5		
44011	41.1N	066.6W	729	7.5	03 14	2.6	1.2	19.7	42.3	21.2	12.3	3.1		
45001	48.0N	087.6W	725	5.0	02 05	1.5	21.2	42.6	28.9	4.4	2.7			
45003	45.3N	082.8W	076	4.0	02 23	2.0	6.5	34.2	42.1	13.1	3.9			
45008	44.3N	082.4W	068	4.0	02 08	2.0	26.4	19.1	16.1	29.4	8.8			
46001	56.3N	148.3W	742	9.5	16 21	4.0			11.8	33.9	43.3	9.8	0.9	
46002	42.5N	130.3W	740	8.5	07 23	3.1		15.5	35.6	21.7	20.0	6.3	0.9	
46003	51.9N	155.7W	736	11.5	14 10	4.3			5.1	28.9	57.7	6.3	0.8	0.9
46004	50.9N	135.9W	741	8.5	04 16	3.5		0.6	25.3	32.9	36.8	3.2	0.9	
46006	40.8N	137.6W	742	10.0	04 12	3.8		0.4	20.0	41.3	27.4	9.0	1.4	0.1
46010	46.2N	124.2W	492	4.0	23 14	1.7		53.8	42.6	3.2	0.2			
46011	34.9N	120.9W	743	6.0	03 05	2.2	4.5	30.4	39.1	15.8	8.8	0.8	0.2	
46012	37.4N	122.7W	737	7.5	02 23	2.2	1.8	36.2	36.7	14.5	9.6	0.9		
46013	38.2N	123.3W	686	8.5	02 21	2.4		28.7	41.8	17.1	11.0	0.8	0.2	
46014	39.2N	124.0W	743	8.5	02 20	2.7	0.6	23.8	34.4	20.8	17.6	2.0	0.5	
46022	40.8N	124.5W	741	8.5	02 19	2.5		28.0	38.8	17.5	14.5	0.6	0.2	
46023	34.3N	120.7W	650	5.0	05 22	2.1	2.6	36.6	35.6	17.6	7.3			
46025	33.6N	119.0W	375	4.5	03 11	1.7	5.3	50.6	32.8	8.8	2.4			
46026	37.8N	122.7W	730	6.5	02 23	1.9	3.0	47.9	33.2	11.6	3.4	0.6		
46027	41.8N	124.4W	741	8.0	02 21	2.4	0.6	29.9	39.6	15.6	12.8	1.0	0.1	
46028	35.8N	121.9W	738	7.5	03 03	2.4	1.6	28.4	35.5	20.0	13.2	1.0		
46035	57.0N	177.7W	741	7.5	01 15	3.6		0.2	29.6	29.9	31.3	8.7		
51001	23.4N	162.3W	743	8.0	10 11	3.2		3.6	44.1	26.1	19.3	6.4	0.2	
51002	17.2N	157.8W	744	5.0	11 02	2.7		3.6	56.3	28.8	11.1			
51003	19.2N	160.8W	744	6.0	10 17	2.7		6.9	53.4	23.7	15.1	0.5		
51004	17.5N	152.5W	742	5.5	03 02	2.7		2.2	59.0	28.0	10.6			
51005	20.3N	156.1W	523	3.0	31 18	1.4		85.0	13.7	1.1				
CHLV2	36.9N	075.7W	209	2.5	01 08	1.2	39.2	35.4	25.3					
FFIA2	57.3N	133.6W	123	0.0	00 00	0.0								30.0

DECEMBER 1985			PRESSURE (MB)							WIND SPEEDS (KNOTS)			MEAN WIND SPEED (KNOTS)								
BUOY	LAT	LONG	OBS	DAYS	MAX	DY HR	MIN	DY HR	MEAN	OBS	MAX	DY HR	DIR	N	NE	E	SE	S	SW	W	NW	TOTAL
41001	34.9N	072.9W	742	31	1029.6	10 15	1001.7	14 11	1016.1	740	38	07 07	340	13.3	12.2	6.4	9.8	13.0	17.5	17.4	15.0	15.0
41006	29.3N	077.3W	744	31	1029.4	27 15	1000.8	25 07	1020.8	739	26	14 16	290	10.4	8.1	6.5	6.5	10.8	10.9	12.4	12.9	10.4
42001	25.9N	089.7W	538	23	1029.4	26 16	1011.1	01 08	1020.9	531	27	14 07	330	15.0	11.6	8.1	10.3	11.6	11.5	8.8	14.8	12.1
42002	26.0N	093.5W	742	31	[illegible]	14 17	1009.2	01 10	1020.6	742	33	18 15	050	25.6	18.1	15.7	13.8	15.7	11.0	9.8	9.6	16.0
42003	26.0N	085.9W	738	31	1029.7	26 15	1012.2	24 20	1021.0	738	32	14 11	330	14.8	12.6	13.4	13.4	12.3	12.1	13.2	22.7	13.8
42007	30.1N	088.9W	553	25	1031.0	15 16	1009.1	13 09	1021.8	542	25	02 10	040	12.7	11.7	8.0	9.0	9.7	8.0	8.0	15.7	10.6
44004	38.5N	070.7W	273	12	1023.6	31 05	998.9	25 18	1013.8													
44005	42.7N	068.4W	744	31	1028.6	01 04	987.2	02 21	1013.6	743	32	19 03	290	9.1	9.3	10.4	12.1	14.0	14.6	16.7	14.8	14.2
44007	43.5N	070.1W	740	31	1030.4	01 02	985.4	02 18	1013.8	717	35	03 03	260	10.0	8.5	10.1	14.3	16.1	16.9	16.6	12.4	14.2
44008	40.5N	069.5W	742	31	[illegible]	28 01	990.8	02 20	1014.6	727	35	03 00	260	12.2	13.4	16.7	12.1	11.3	16.1	17.2	15.7	15.6
44009	38.5N	074.6W	292	13	1032.7	04 14	998.4	02 17	1019.9	277	33	03 00	290	12.5	15.3	8.7	2.0	13.5	13.9	17.1	15.0	14.3
44011	41.1N	066.6W	742	31	1028.8	20 15	992.1	02 22	1013.9	740	34	15 01	290	15.4	14.4	13.8	12.3	11.5	11.8	10.3	16.3	15.6
44012	38.8N	074.6W	726	31	1035.5	19 16	998.2	02 16	1018.2	710	35	02 17	290	13.0	12.3	10.8	6.4	16.2	15.8	14.5	17.5	15.3
44013	42.4N	070.8W	744	31	1029.4	04 13	987.6	02 18	1015.0	739	33	18 19	270	12.4	7.8	10.4	11.5	11.8	13.9	15.7	12.3	13.3
45001	48.0N	087.6W	741	31	1029.5	03 16	986.9	31 00	1012.8													
45003	45.3N	082.8W	076	04	1029.7	03 21	984.3	02 00	1011.1	076	27	03 00	330	19.9	16.7	18.5		12.0	14.8	10.9	18.2	17.1
45007	42.7N	087.1W	472	20	1033.0	03 16	989.9	01 21	1020.7	466	37	02 02	220	13.3	11.8	11.6	9.3	12.2	16.5	12.6	16.2	14.0
45008	44.3N	082.4W	068	03	1029.3	03 17	987.1	02 03	1008.5	022	04	01 19	230					0.7	1.4	4.0		01.3
46001	56.3N	148.3W	742	31	1031.3	25 09	974.6	04 21	1002.9	737	36	16 21	230	8.3	12.6	17.4	17.7	15.6	14.1	12.3	8.4	15.4
46002	42.9N	130.3W	741	31	1034.1	09 19	975.2	02 10	1020.0	711	33	01 15	120	9.3	10.9	8.1	10.4	11.7	9.8	19.4	13.9	11.2
46003	51.9N	155.7W	742	31	1019.0	25 05	964.1	20 20	994.4	738	38	22 08	230	13.9	17.5	13.7	19.2	16.1	15.9	15.7	15.2	16.3
46004	50.9N	135.9W	743	31	1032.4	09 12	968.9	04 12	1015.2	736	31	04 16	240	9.3	8.5	14.2	14.4	14.0	12.8	6.7	10.1	13.4
46006	40.8N	137.6W	743	31	1029.9	08 08	980.0	01 22	1017.0	739	34	02 08	310	11.0	11.3	9.7	15.5	14.8	14.6	17.3	21.6	14.9
46010	46.2N	124.2W	503	22	1033.3	17 05	1016.5	31 23	1026.1	503	23	25 11	080	5.7	7.9	11.9	6.8	12.4	12.8		4.5	11.0
46011	34.9N	120.9W	743	31	1028.2	13 19	1008.0	02 14	1021.3	686	26	02 15	140	9.1	6.8	3.4	10.1	10.3	3.1	3.3	10.0	07.8
46012	37.4N	122.7W	738	31	1029.0	13 18	1001.7	02 13	1021.4	736	36	02 06	150	8.1	8.9	8.0	10.8	11.5	3.4	6.1	8.5	08.9
46013	38.2N	123.3W	733	31	1030.1	13 18	999.8	02 13	1022.5	722	28	02 07	140	5.5	6.8	10.9	12.1	12.5	6.3	5.6	8.1	09.4
46014	39.2N	124.0W	744	31	1029.7	13 19	993.9	02 13	1021.9	708	35	02 09	140	6.4	4.4	5.3	14.5	7.4	6.1	6.5	7.0	07.7
46016	63.3N	170.3W	245	31	1017.7	26 03	980.8	20 00	998.3	247	27	20 03	240	7.7	9.8	12.6	13.3	10.9	13.5	10.4	7.3	11.4
46017	60.3N	172.3W	237	31	1010.1	25 21	972.8	22 12	990.7	245	35	19 09	030	17.7	19.9	18.2	15.3	14.2	11.2	13.0	5.0	16.9
46022	40.8N	124.5W	741	31	1029.4	13 15	985.7	02 15	1021.5	709	39	02 15	180	8.6	5.3	4.7	8.0	13.2	7.8	6.7	5.9	08.4
46023	34.3N	120.7W	743	31	1028.1	13 19	1011.0	02 15	1021.2	727	27	08 12	330	9.6	3.1	9.3	10.1	6.0	4.7	4.1	10.6	09.4
46025	33.6N	119.0W	376	16	1026.5	13 19	1011.1	11 00	1019.2	354	24	09 00	290	8.0	9.3	8.3	10.9	3.5	3.5	6.9	8.6	07.9
46026	37.8N	122.7W	742	31	1030.3	13 19	1001.4	02 13	1022.7	741	28	02 09	160	8.5	12.8	12.6	10.6	10.4	5.5	9.2	8.6	11.7
46027	41.8N	124.4W	741	31	[illegible]	13 15	983.9	02 16	1022.3	689	41	02 14	140	6.9	4.7	3.6	12.2	11.1	5.9	3.9	4.2	07.4
46028	35.8N	121.9W	741	31	1028.5	13 18	1007.0	02 13	1021.8	687	30	02 11	150	8.8	2.4	3.9	9.5	7.5	2.6	2.9	8.8	07.3
46030	40.4N	124.5W	744	31	1029.5	13 15	988.2	02 14	1021.7	233	16	26 13	350	7.6	3.5	3.0	4.0	3.2	1.6	1.8	4.1	05.1
46035	57.0N	177.7W	744	31	1000.0	31 23	968.1	27 16	985.4	737	31	07 08	100	15.0	16.4	18.5	15.0	12.6	14.4	14.8	11.9	15.6
51001	23.4N	162.3W	744	31	1023.7	01 20	1000.0	15 14	1016.8	725	24	01 02	060	8.2	9.7	11.6	7.9	8.3	11.4	8.6	11.4	10.2
51002	17.2N	157.8W	744	31	1019.1	28 19	1008.4	16 02	1014.5	741	24	02 10	080	8.5	12.6	14.8	7.7	6.9	7.8	7.7	7.7	12.7
51003	19.2N	160.8W	744	31	1020.9	28 20	1008.4	16 02	1015.8	143	20	01 04	030		20.4	12.1	10.4	3.0				13.3
51004	17.8N	152.5W	742	31	1018.1	28 20	1007.4	16 12	1013.6	740	25	02 02	040	12.0	14.4	12.1	10.6	11.5	11.5	6.7	5.5	12.7
51005	20.3N	156.1W	526	23	1019.4	28 20	1005.6	16 04	1013.7	525	31	30 11	050	8.6	15.4	10.8	3.0	9.7	10.8	8.6	4.0	13.0
ALRF1	24.9N	080.6W	741	31	1029.9	26 15	1013.5	24 22	1020.3	640	26	11 08	090	12.3	14.7	15.4	11.6	12.0	12.7	9.7	10.8	12.8
ALSN6	40.5N	073.8W	738	31	1032.4	04 15	994.9	02 15	1017.4	703	45	02 18	300	17.6	13.4	16.0	8.6	7.1	16.7	15.6	17.3	16.3
BURL1	28.9N	089.4W	742	31	1031.2	15 16	1009.5	13 08	1022.2	662	31	14 12	310	13.1	9.6	13.3	12.6	11.5	11.4	11.9	15.3	13.0
BUZM3	41.4N	071.0W	743	31	[illegible]	04 14	990.3	02 18	1016.0	734	41	02 22	250	13.5	13.2	14.1	15.4	15.2	18.5	10.8	15.5	14.8
CARO3	43.3N	124.4W	743	31	1031.7	16 17	981.2	02 16	1022.2	739	39	02 18	200	10.3	5.9	4.0	5.0	10.5	8.6	3.7	2.5	06.7
CHLV2	36.9N	075.7W	732	31	1032.9	19 15	1002.8	02 17	1018.9	696	35	02 19	290	17.6	13.7	8.2	3.7	13.7	16.9	13.9	16.2	15.7
CLKN7	34.6N	076.5W	669	31	1031.1	10 15	1004.2	14 08	1020.1	627	28	02 21	270	10.9	9.7	5.0	5.6	4.6	11.6	12.4	10.7	11.8
CSBF1	29.7N	085.4W	737	31	1032.2	26 15	1008.9	13 09	1021.5	605	18	13 12	190	4.4	4.2	4.5	4.3	8.3	7.0	7.7	6.2	05.4
DBLN6	42.6N	079.4W	501	22	1032.1	04 02	988.9	02 08	1017.9	491	50	02 20	260	10.1	12.6	3.9	5.7	6.3	15.2	25.0	12.4	13.6
DESW1	47.7N	124.5W	728	31	1034.4	17 18	981.6	02 23	1023.3	708	33	06 03	160	2.7	3.9	3.8	11.9	5.4	9.7	1.3	3.0	06.5
DISW3	47.1N	090.7W	743	31	1031.1	03 16	990.4	26 19	1015.7	731	30	02 02	350	26.5	25.7		7.5	10.6	16.2	18.3	16.6	16.8
DSLN7	35.2N	075.3W	673	29	1031.4	10 15	[illegible]	[illegible] 19	1019.7	699	35	02 23	300	15.0	7.0	5.5	10.3	9.6	10.4	16.3	16.2	16.2
FBIS1	32.7N	079.9W	742	31	1030.7	04 15	1007.2	14 06	1021.9	705	18	06 21	010	5.8	7.9	3.3	3.9	4.8	8.1	5.3	5.6	06.2
FFIA2	57.3N	133.6W	739	31	1038.6	09 11	980.4	04 20	1019.2	699	40	04 20	140	7.7	3.0	2.9	15.2	11.8	2.3	4.9	5.1	10.0
FPSN7	33.5N	077.6W	741	31	1030.7	10 15	1005.5	14 09	1020.7	684	36	17 18	220	13.0	8.2	5.3	3.5	15.7	20.0	17.1	13.5	15.3
GDIL1	29.3N	089.9W	732	31	1031.7	14 15	1010.1	13 05	1022.3	681	25	02 09	350	13.1	9.0	6.7	7.0	7.5	8.3	7.9	12.6	09.4
GLLN6	43.9N	076.4W	743	31	1031.1	04 14	988.6	02 09	1013.9	734	46	02 14	250	7.8	7.4	5.5	14.3	22.9	23.8	24.0	17.1	17.9
IOSN3	42.9N	070.6W	743	31	1029.4	01 01	986.1	02 18	1014.2	718	35	03 04	260	11.3	10.2	11.5	13.0	17.6	17.7	17.8	13.8	15.9
LKWF1	26.6N	080.0W	744	31	1029.7	26 15	1011.6	25 07	1020.3	722	23	11 02	090	9.4	12.9	13.6	10.7	11.4	6.0	4.1	6.1	09.7
MDRM1	44.0N	068.1W	744	31	1030.9	01 01	984.9	02 20	1013.5	726	42	02 11	140	12.8	16.4	13.0	10.1	17.9	21.1	19.2	18.6	17.9
MISM1	43.8N	068.9W	742	31	1030.7	01 03	985.1	02 19	1013.8	715	42	02 11	140	12.4	12.1	13.4	10.1	20.3	20.1	21.2	19.2	18.0
NWPO3	44.6N	124.1W	738	31	1032.5	09 18	979.9	02 19	1022.6	712	37	02 23	220	5.4	6.3	8.2	5.3	12.2	15.0	2.8	3.1	08.1
PTAC1	38.9N	123.7W	741	31	1029.4	13 18	996.6	02 11	1021.7	712	33	02 09	150	4.5	2.0	3.4	8.0	7.1	2.3	4.4	4.0	05.2
PTAT2	27.8N	097.1W	740	31	1037.2	14 16	1005.6	01 00	1021.8	644	29	01 15	350	13.0	6.8	6.3	9.8	7.1	5.7	5.5	11.5	10.4
PTGC1	34.6N	120.7W	720	31	1027.7	13 18	1008.0	02 14	1020.8	619	39	02 14	130	9.3	4.5	3.3	10.5	4.4	1.5	2.0	14.2	08.3
ROAM4	47.9N	089.3W	475	20	1029.9	03 13	1006.3	15 04	1019.6	434	45	02 02	020	15.9	22.5			12.8	17.2	16.2	15.5	16.6
SBIO1	41.7N	082.8W	552	26	1031.2	19 16	994.2	24 07	1015.1	547	38	02 06	200	9.6	4.7	6.4	9.8	15.5	17.0	18.0	17.0	15.9
SGNW3	43.6N	087.7W	583	27	1033.8	03 16	987.7	01 22	1016.1	736	32	02 01	350	14.2	19.6	13.3		15.3	9.9	12.8	13.7	12.7
SISW1	48.3N	122.9W	741	31	1036.6	17 18	985.8	03 01	1025.5	700	31	07 16	160	4.2	3.5	6.3	11.3	10.1	2.6	1.9	3.7	06.5
SJLF1	30.4N	081.4W	744	31	1031.7	26 16	1009.9	25 04	1022.2	726	20	14 16	310	7.1	8.3	5.9	4.0	7.3	7.0	6.7	8.8	07.5
SPGF1	26.7N	079.0W	693	31	1029.9	27 15	1011.0	25 09	1020.6	685	27	26 06	320	11.6	9.8	10.3	5.2	3.9	4.7	3.6	11.4	09.9
SRST2	29.7N	094.1W	743	31	1035.5	14 16	1008.1	01 08	1022.7	675	20	02 02	350	9.1	7.0	7.8	8.3	8.7	7.9	7.3	9.1	08.2
STDM4	47.2N	087.2W								723	50	02 05	030	21.1	24.5	14.1	2.7	21.9	15.4	17.4	19.8	19.0
SVLS1	31.9N	080.7W	741	31	[illegible]	26 14	1000.1	14 05	1021.9	719	42	14 14	200	12.9	12.5	7.4	5.5	13.3	15.2	15.2	15.6	13.8
TPLM2	38.9N	076.4W	743	31	1033.1	19 15	997.9	02 14	1017.5	722	30	02 15	290	9.3	6.1	5.5	5.7	11.1	10.2	10.9	12.1	10.1
TTIW1	48.4N	124.7W	742	31	1035.0	17 17	983.3	02 23	1023.5	741	[illegible]	[illegible]	080	2.0	16.0	17.7	10.4	10.9	14.4	7.8	1.4	10.8
WPOW1	47.7N	122.4W	743	31	1034.6	17 12	984.8	03 00	1024.0	716	32	03 07	190	7.4	4.4	3.6	4.6	9.2	2.6	3.3	2.5	05.8

DECEMBER 1985			TOTAL FREQUENCY OF WIND SPEEDS (%)							TOTAL FREQUENCY OF WIND DIRECTIONS (%)							
BUOY	LAT	LONG	CALM	<4KT	4-10KT	11-21KT	22-33KT	34-47KT	>47KT	N	NE	E	SE	S	SW	W	NW
41001	34.9N	072.9W		3.2	16.1	61.8	18.8	0.1		9.6	3.0	1.6	1.9	2.1	23.3	33.2	25.3
41006	29.3N	077.3W		12.9	39.2	44.5	3.4			12.2	10.6	7.8	9.2	12.8	14.6	14.8	18.1
42001	25.9N	089.7W		4.0	36.2	55.6	4.3			25.6	25.5	10.6	7.6	9.7	7.0	6.2	7.9
[illegible]	26.0N	093.5W		1.1	15.1	66.6	17.3			6.8	19.4	20.4	21.1	15.0	6.0	1.5	1.7
42003	26.0N	085.9W		2.0	26.0	62.1	9.9			19.3	28.4	16.5	18.9	8.3	2.4	0.9	5.4
42007	30.1N	088.9W		8.5	45.8	41.7	4.1			20.8	22.9	20.1	10.5	9.7	4.8	5.2	6.0
44005	42.7N	068.4W		4.4	24.2	60.3	11.0			8.1	4.1	5.3	6.7	6.2	13.7	31.9	24.0
44007	43.5N	070.1W	3.5	5.7	25.7	55.0	12.7	0.1		14.1	6.7	2.2	3.1	3.4	17.5	35.4	17.6
44008	40.5N	069.5W	1.0	1.9	26.4	54.9	16.4	0.4		5.4	6.6	8.8	2.7	5.8	11.9	27.6	31.4
44009	38.5N	074.6W	4.8	6.1	34.3	40.1	19.5			27.6	8.4	1.6	0.1	9.8	19.1	12.2	21.1
44011	41.1N	066.6W		2.4	19.7	58.4	19.3	0.1		5.6	7.1	6.9	7.3	8.8	7.9	36.2	20.2
44012	38.8N	074.6W	2.5	3.8	27.7	50.6	17.0	0.8		12.3	11.0	3.3	0.5	14.2	18.1	8.5	32.2
44013	42.4N	070.8W	1.6	3.9	28.1	62.9	5.0			4.5	2.3	7.5	4.2	8.1	24.2	30.1	19.2
45003	45.3N	082.8W			17.1	59.2	23.7			7.9	21.1	13.2		1.0	9.9	7.2	39.8
45007	42.7N	087.1W	0.4	1.5	30.9	57.1	9.9	0.6		4.8	4.7	5.3	2.6	8.2	15.0	31.8	27.7
45008	44.3N	082.4W	50.0	86.4	13.6									35.2	61.4	3.4	
46001	56.3N	148.3W		4.7	20.4	53.6	20.9	0.4		5.9	4.5	19.2	34.8	13.0	10.2	7.2	5.2
46002	42.9N	130.3W		9.0	46.6	33.1	11.4			8.1	18.5	11.3	20.9	20.9	9.0	8.2	3.2
46003	51.9N	155.7W		1.8	19.9	54.7	22.6	0.9		3.8	5.8	9.7	18.3	18.7	20.6	18.2	4.9
46004	50.9N	135.9W		2.6	26.6	65.6	5.2			2.4	2.2	10.5	24.4	40.7	13.2	1.9	4.7
46006	40.8N	137.6W		2.7	27.9	51.0	18.3	0.1		2.0	6.2	7.4	36.9	22.5	10.9	10.2	3.8
46010	46.2N	124.2W		3.0	37.6	58.8	0.6			4.1	13.3	77.3	2.4	1.2	1.5		0.1
46011	34.9N	120.9W		30.6	41.3	24.3	3.8			16.9	17.9	10.8	9.6	8.1	5.5	6.7	24.3
46012	37.4N	122.7W		12.0	55.4	29.9	2.2	0.5		23.6	24.2	13.5	14.2	9.2	1.7	1.6	12.1
46013	38.2N	123.3W		10.7	49.4	37.4	2.5			11.9	11.9	43.6	13.3	3.3	1.7	3.7	10.7
46014	39.2N	124.0W		24.6	56.4	14.7	4.0	0.4		26.1	12.8	15.3	19.3	10.0	1.3	3.3	11.9
46016	63.3N	170.3W		0.8	46.2	45.3	7.7			6.6	27.8	20.3	3.2	2.3	26.7	12.7	0.3
46017	60.3N	172.3W		3.3	18.8	50.6	25.7	1.6		6.6	22.6	25.0	20.5	12.6	4.0	0.6	0.2
46022	40.8N	124.5W		19.7	54.3	21.7	3.9	0.3		27.2	12.7	8.3	16.4	19.2	8.1	2.9	5.3
46023	34.3N	120.7W		18.6	47.0	29.4	5.0			16.0	2.0	5.5	11.7	2.8	2.6	7.7	51.8
46025	33.6N	119.0W		22.9	51.4	25.1	0.6			10.2	11.1	4.6	5.3	4.5	4.3	23.9	36.1
46026	37.8N	122.7W		6.7	30.0	62.1	1.2			3.5	45.9	23.3	7.0	7.4	1.3	4.9	7.9
46027	41.8N	124.4W	21.5	26.7	47.0	19.4	6.0	0.9		18.2	16.1	13.4	19.2	15.1	7.5	2.5	7.9
46028	35.8N	121.9W		34.9	38.1	25.2	1.7			12.4	1.5	3.5	18.3	13.2	5.6	14.1	31.4
46030	40.4N	124.5W	21.0	25.8	62.2	12.0				42.0	13.5	1.5	5.9	16.5	4.3	2.3	14.1
46035	57.0N	177.7W		3.9	14.7	64.3	17.1			13.3	14.2	24.0	15.8	9.4	13.7	4.4	5.1
51001	23.4N	162.3W		10.3	44.8	42.6	2.2			14.1	13.7	26.3	6.8	3.1	8.4	10.9	16.8
51002	17.2N	157.8W		1.6	34.3	60.9	3.2			6.0	33.9	46.7	4.5	0.9	1.4	3.3	3.2
51003	19.2N	160.8W		0.7	40.6	41.3	17.5				28.5	3.7	67.3	0.5			
51004	17.5N	152.5W		2.7	25.8	70.3	1.2			6.2	44.1	32.1	5.5	4.0	4.1	1.5	2.5
51005	20.3N	156.1W	3.8	10.9	27.2	53.1	8.8			1.8	58.8	11.4	3.0	5.5	11.5	8.5	0.1
ALRF1	24.9N	080.6W	0.9	3.3	28.6	64.1	4.1			26.9	10.1	23.4	9.3	3.9	2.9	6.3	17.2
ALSN6	40.5N	073.8W	1.6	3.1	20.5	51.5	22.6	2.3		12.4	7.9	10.1	1.4	1.0	9.9	20.2	37.1
BURL1	28.9N	089.4W	0.3	3.8	28.9	60.7	6.6			34.0	9.6	8.8	9.7	7.7	3.5	4.3	22.4
BUZM3	41.4N	071.0W	0.8	2.5	20.6	49.3	25.7	1.9		4.5	8.7	5.8	3.0	3.6	17.8	35.6	21.2
CARO3	43.3N	124.4W	7.2	29.6	50.9	16.6	2.4	0.4		6.4	18.9	17.6	24.5	18.9	10.6	2.5	0.5
CHLV2	36.9N	075.7W	1.9	7.6	16.1	54.3	21.3	0.7		15.7	6.5	1.1	0.5	10.1	29.8	12.6	23.7
CLKN7	34.6N	076.5W	2.9	9.9	37.6	49.6	2.9			23.1	3.4	0.1	0.8	3.5	20.4	20.8	19.8
CSBF1	29.7N	085.4W	1.6	28.6	63.9	7.4				22.3	20.0	11.0	9.8	10.0	5.5	5.5	15.8
DBLN6	42.6N	079.4W	2.0	15.5	34.8	26.7	17.3	5.1	0.6	3.6	5.7	1.6	11.9	23.6	20.2	24.1	9.2
DESW1	47.7N	124.5W	14.3	43.4	34.9	15.3	6.5			10.8	18.3	14.9	30.8	11.4	4.7	4.2	5.0
DISW3	47.1N	090.7W	0.4	1.5	21.1	48.6	27.1	1.8		4.6	2.6		2.2	14.2	22.6	35.8	18.0
DSLN7	35.2N	075.3W	1.7	6.8	20.6	46.6	26.2	0.6		13.9	2.9	0.3	0.6	1.2	25.8	27.3	28.0
FBIS1	32.7N	079.9W	2.0	26.1	58.6	15.3				15.7	13.7	3.8	2.0	4.5	19.0	19.5	21.8
FFIA2	57.3N	133.6W	14.2	23.7	28.0	40.6	6.3	1.1		11.4	18.0	6.0	38.5	20.1	2.5	0.3	3.3
FPSN7	33.5N	077.6W	4.4	8.2	19.6	44.2	27.9	0.1		10.8	7.0	0.4	0.4	6.6	21.1	23.0	22.7
GDIL1	29.3N	089.9W	2.1	8.4	57.6	32.0	2.1			20.8	26.9	16.5	12.3	7.5	3.5	2.1	10.5
GLLN6	43.9N	076.4W	1.2	5.6	24.8	30.4	33.8	5.4		4.7	12.7	5.9	5.8	15.5	16.2	19.5	19.7
IOSN3	42.9N	070.6W	1.3	2.9	18.8	58.4	18.9	1.0		4.7	3.5	7.3	2.9	5.8	23.2	38.2	14.4
LKWF1	26.6N	080.0W	0.6	6.4	52.6	40.6	0.4			9.7	6.9	19.7	6.6	11.2	5.4	8.1	32.4
MDRM1	44.0N	068.1W	0.3	2.3	17.2	48.9	28.0	3.6		10.9	6.4	3.2	5.9	6.7	9.3	25.1	32.4
MISM1	43.8N	068.9W		2.9	17.9	47.7	25.2	6.3		7.3	6.1	4.2	5.8	5.6	14.8	34.5	21.8
NWPO3	44.6N	124.1W	4.1	13.3	60.3	23.7	2.5	0.1		2.7	10.9	58.1	3.3	7.2	5.8	1.1	2.8
PTAC1	38.9N	123.7W	19.2	43.5	43.5	10.1	2.8			16.2	13.9	21.1	21.3	19.6	2.3	1.7	3.9
PTAT2	27.8N	097.1W	2.6	7.9	46.3	42.5	3.3			36.4	12.7	6.8	14.1	6.4	3.2	3.6	16.7
PTGC1	34.6N	120.7W	19.9	38.4	30.7	18.4	12.0	0.5		30.7	4.6	0.5	14.5	24.7	2.4	1.5	13.8
ROAM4	47.9N	089.3W	0.2	1.6	16.9	59.0	18.8	3.7		26.2	12.4			4.0	8.7	10.0	38.8
SBIO1	41.7N	082.8W	2.0	5.1	16.3	55.2	21.0	0.9		3.8	4.8	0.6	3.7	5.9	25.3	42.3	12.2
SGNW3	43.6N	087.7W	0.1	3.4	33.3	56.8	6.5			5.4	1.9	2.1		3.8	21.3	42.7	22.8
SISW1	48.3N	122.9W	13.4	38.1	39.7	18.5	3.7			15.8	12.6	29.4	20.9	10.4	1.8	0.8	0.2
SJLF1	30.4N	081.4W	2.8	12.5	68.2	19.3				10.5	13.2	4.4	4.2	0.5	15.0	11.9	32.2
SPGF1	26.7N	079.0W	5.5	16.8	46.4	33.9	2.9			7.2	18.2	33.6	0.7	7.5	8.5	1.8	14.5
SRST2	29.7N	094.1W	2.2	9.8	63.6	26.7				20.3	19.2	17.7	10.7	8.9	4.1	2.2	9.1
STDM4	47.2N	087.2W	1.0	1.8	12.9	46.7	33.9	2.2	0.6	11.7	6.3	3.5	1.1	1.7	8.9	20.3	46.6
SVLS1	31.9N	080.7W	1.8	3.6	28.4	58.0	9.7	0.3		11.1	16.6	2.7	3.2	11.9	16.1	14.9	23.6
TPLM2	38.9N	076.4W	3.6	15.7	39.1	41.0	4.3			8.8	4.7	6.2	5.9	18.5	13.8	18.9	23.1
TTIW1	48.4N	124.7W	1.6	8.2	24.8	40.8	22.0	4.5	0.5	8.1	15.2	63.6	8.6	9.2	2.5	0.4	0.4
WPOW1	47.7N	122.4W	12.4	37.2	48.9	11.6	2.4			19.8	31.5	6.2	14.8	20.8	5.5	0.8	1.4

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